

1959; f. nov.

Haec forma a forma typica speciei corollis albis recedit.

This form differs from the typical form of the species in having white corollas.

The type of the form was collected by my good friend, Raulino Reitz (no. C.1280) in the state of Santa Catarina, Brazil, and is deposited in the Britton Herbarium at the New York Botanical Garden.

VERBENA TENUISECTA var. GLABRATA Moldenke, Résumé 111, nom. nud. 1959; var. nov.

Haec varietas a forma typica speciei laminis foliorum subglab-ratis et calicibus sparsissime strigillosis recedit.

This variety differs from the typical form of the species in having its leaf-blades subglabrate and the calyx very sparsely strigillose.

The type of the variety was collected by Raulino Reitz (no. C.1280e) at 10 meters altitude in the state of Santa Catarina, Brazil, flowering in October, and is deposited in the Britton Herbarium at the New York Botanical Garden.

VERBENA URTICIFOLIA var. INCARNATA (Raf.) Moldenke, comb. nov.
Verbena incarnata Raf., Atl. Journ. 154. 1832.

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MATERIALS TOWARD A MONOGRAPH OF THE GENUS AVICENNIA. III

Harold N. Moldenke

AVICENNIA MARINA var. RESINIFERA (Forst.) Bakh.

Miss Moore says that it can be safely assumed that the collections which give no further collection locality than "New Zealand" on their labels actually came from North Island since Avicennia does not extend south of 38°, which is about the center of North Island. Cheeseman, in the reference cited above, says that it occurs in "Muddy creeks and estuaries from the North Cape [of North Island] to Opotiki on the East coast and Kawhia on the west." Cockayne, in his "The distribution of the vegetation and flora of New Zealand", page 14, affirms that this is one of the 56 species, of which 45 are common or fairly common plants, which are stopped by the 38° S. phytogeographic barrier. In his "New Zealand plants and their story", edition 2, page 35 (1919) he says "in imagination, sail up one of the tidal rivers of these wide estuaries in the west of the North Auckland Botanical District -- Hokianganga or Kaipara Harbour -- or one of the tidal rivers of the east -- the Whangarei for instance. If it is high tide, we shall see on either side of the stream a belt of close-growing, dull-coloured, small trees, rising out of the turbid water. These

consist of the mangrove, and the sight is one almost unknown in any other land outside the tropics. It is, in fact, one of the natural wonders of New Zealand."

L. M. Cranwell, in a newspaper article for children entitled "Mangrove or manawa, Prince of No-man's-land", says "It is a tropical wanderer, common, they say, from the Red Sea to the eastern coast of Australia, so that it is one of the wonders of plant life to see it so happy here in our colder estuaries. Spread by its bouyant fruits, it washes hither and thither, but it will not grow further south than Kawhia and Opotiki. Frosty winters and sandy shores even then make life too difficult for it on many shores north of these two points. It is small enough in the Auckland Harbour, but it is a mere pigmy at Opotiki. If you wish to see really fine groves you should go north, say to the Bay of Islands. There, every snake-like river, twisting lazily to sea between the low blue hills, is hemmed in and glorified by manawa. The gnarled grey limbs are tall and sturdy, lifting their bronze foliage 30 ft. or so above the shadowed mud, crammed fill of brittle roots and the soggy home of the little crabs."

In all, 303 herbarium specimens, including the types of all the names involved, and 8 mounted photographs and illustrations have been examined.

Citations: SUMATRA: Lürzing 9292 (Bz--16944). JAVA: Bakhuizen van den Brink 1191 (Bz--16872); Leeuwen-Reijnvaan s.n. [6 November 1910] (Bz--16889); Leschenault 213 (P). CELEBES: Barclay s.n. (Cl); Teijsmann 13791 (Bz--17075, Bz--17076, Le). LESSER SUNDA ISLANDS: Billiton: Teijsmann s.n. [Blitoeng] (Bz--16957). Timor: Bemmel 9 [Boschproefst. BB.6945] (Bz--17057, Bz--17058); Collector undesignated s.n. [Timor] (B, P); Gaudichaud 102 (B, P), s.n. (P); Herb. Mus. Paris s.n. (Le); Riédlé s.n. (P, P). Wetar: Bloembergen 181 [Boschproefst. BB.27297] (Bz--16839). MOLUCCA ISLANDS: Taliaboe: Atjeh s.n. [Hulstijn 114] (Bz--17060, Bz--17061, Bz--17062). Island undetermined: Collector undesignated s.n. [Molucca] (Le, Le); Herb. Forster s.n. [Molucca] (Bm, Le, Le, Le). NEW GUINEA: Dutch New Guinea: Brandenhorst 227 (Bz--17066); Kanehira & Harusima 12889 (Bz--17063). Papua: Brass 882 (Bz--17065); Jaheri s.n. [Meranke, 15.IV.1901] (Bz--17070, Bz--17071, Le); J. W. R. Koch s.n. [Meranke] (Bz--17069); F. J. H. von Mueller 10 (Mb); L. S. Smith 1386 (Ng--6499). SOLOMON ISLANDS: Malaita: Kajewski 2344, in part (Bz--17077, Bz--17078, Bz--17079, S). Sohan: Rechinger & Rechinger 4927 (V, V), s.n. (V--photo). NEW CALLEDONIA: Balansa 1337 (B, Bm, Br, Cb, Cb, Cb, Cl, Cp, Ed, K, La, N, X); Collector undesignated 182 (K); Compton 2 (Bm); Deplanche 343 (Dr, K), 1050 (Le, X), s.n. [Vieillard 1050] (K); Franc 2127 (Cb, K), s.n. [Bonati 2127] (Cb); Germaine s.n. [Nouméa] (B, K); Grunow s.n. [16/8/1884] (B), s.n. [Novbr. 1884] (V); Herb. Baillon s.n. (P); J. M. Hildebrandt 272 (V); Pancher s.n. [1870] (Le),

s.n. (Bm, K); Viellard 1050 (Pa, V, V); C. T. White 2147 (B, Cp, K). AUSTRALIA: New South Wales: Banks & Solander s.n. [Bustard Bay, 1770] (Bm); F. L. Bauer s.n. [Port Jackson] (V); Beuzeville 426 (Gg--164263); Boorman s.n. [Fish River, 3-1918] (Ca--249350); R. Brown 2329, in part (Bm, Ed, Ed, K, K), s.n. [Port Jackson] (Ed); Caley s.n. [Sydney, 1804] (Us), s.n. [Sydney] (Bm), s.n. (Cb); D'Urville s.n. [Port Jackson, 1826] (Dc); Herb. Bot. Gard. Sydney s.n. [Manning River] (Gg--31940, Vu); J. D. Hooker 169 (K), 831 (K), s.n. [Sydney] (Cl); L. A. S. Johnson 24412 (N); Leichardt s.n. [Sidney] (B); Lesson s.n. [Port Jackson] (B); Maiden 796 (Ut); Meebold 3403 (Mu); C. Moore 61 (K); F. J. H. von Mueller s.n. [Botany Bay] (P, P); F. A. Rodway 298 (Gg--228405), 342 (Gg--226492), s.n. [Aug. 1928] (K); United States Expl. Exped. [Wilkes] s.n. [Sydney] (W--59280). Northern Territory: Bleeser 499 (B, B); R. Brown s.n. [North Coast] (K); Collector undesignated 46 (Vu); M. W. Holtze s.n. [Pt. Darwin; Herb. Prager 18689] (Gg--31941); Johnston & Setchell s.n. [Port Darwin, Feb. 5, 1927] (Ca--402919); Prager 46 (X); Rich. Schomburgk s.n. [N. Coast] (V, V). Queensland: F. M. Bailey 173 (E--118611), s.n. [Moreton Bay] (Du--9534); Carse s.n. [May 1921] (Cp); M. K. Clemens s.n. [Nugee, July 20, 1943] (Or--47770, Or--47771), s.n. [Sherwood, Aug. 10, 1943] (Or--49329, Or--49329); Dallachy s.n. [Rockhampton] (Bm); Dietrich 2354 (B, B, Cl), 2390 (Vu); Flecker 13878 (N); Herb. Bogor. 17081 (Bz); Michael 724, in part (Bz--17080); F. J. H. von Mueller s.n. [Endeavour River] (Cl), s.n. [Gladstone] (Cb, P), s.n. [northern part of York Peninsula] (Mu--1663, V), s.n. [Port Denison] (Br), s.n. [Rockhampton] (P, P), s.n. (B, Le, Ol, Os); Staer s.n. [Sept. 1911] (Ed); Thozet s.n. [1870] (P); Trist 3 (N); Verreaux 673 (P); Wilhelmi s.n. [Rockhampton] (B). South Australia: R. Brown s.n. [Inlet] (Bm), s.n. [South Coast, Inlet] (K), s.n. [South Coast islet] (Ed); Collector undesignated s.n. [Port Adelaide] (V); S. Helms 6 (Cp); Lea s.n. [Port Auputa] (Bm). Victoria: Adcock s.n. [Geelong] (Ed); F. W. Barnard s.n. [Gypsland] (Ed); French s.n. [Western Port] (Bm); Gunn s.n. [Port Philipp] (K, K); Meebold 7304 (Mu); F. J. H. von Mueller s.n. [Wilson's Promontory] (K). Western Australia: Collie s.n. [Cape Naturaliste] (K); DeVriese s.n. [Maduram] (Le); Diels 2741 (B), 3643 (B, B); T. Drummond 223 (Bm, Ed, Lu, P, P, V, X), 225 (Cb), s.n. [Sw. Riv.] (K); Milne s.n. [Shark Bay] (Bm, K, N); A. Morrison s.n. [Mouth of Ashburton River, 15/10/05] (Ed); Ostenfeld 1148 (Cp), 1167 (Cp); Preiss 916 (Cb), 1298 [512; Leschenault Bein] (Ut), 1298 [Swan River] (Dc--859, Le, P, V); Staer s.n. [Aug. 1905] (Ed). State undetermined: Banks & Solander s.n. [1770] (B, Bm, P, V); Baudin s.n. [1801] (P); R. Brown s.n. (B,

N); Collector undesignated s.n. [Mus. de Paris, 1821] (Dc), s.n. [Nouw Holland] (Le, P), s.n. [Port Telfair] (P); D'Urville s.n. [Nova Hollandia] (B); Gunn 14 (K); Herb. Hooker 207 (K); A. Richard s.n. (P); Sieber, Fl. Nov. Holl. 268 (B, B, B, B, B, Bm, Br, C, Cb, Cb, Cp, Dc, K, Le, Le, Mu--1073, Mu--1074, S, V, V, V, V, X); Verreaux s.n. (P, P). LOW ISLAND: Henne & Wilhelmi s.n. (B, B); Oldfield s.n. (K). PHILIP ISLAND: F. W. Barnard s.n. [Philip Isl.] (Ed). SANDY ISLAND: Collector undesignated s.n. (V); Cuming s.n. [1859] (Cb). BAY ISLANDS: S. Berggren s.n. [Oct. 1874] (X). MONTEBELLO ISLANDS: Campania 127 (Bm). HOUTMAN ROCKS: South Island: Gilbert 57 (Bm), s.n. (K). Island undesignated: Wickham & Stokes s.n. [H. M. S. Beagle, 1839--40] (Bm). PRINCE OF WALES ISLAND: R. Brown s.n. (Bm). NORTHUMBERLAND ISLAND: R. Brown 2329, in part (Bm). BRIBIE ISLAND: M. K. Clemens s.n. [Apr. 20-30, 1944] (Or--49587); C. T. White 916 (Bm). LORD HOWE ISLAND: Mallon s.n. (B). NEW ZEALAND: North Island: K. E. Adams 68986 (Z); Banks & Solander s.n. (Bm, W--1276429); Bennett s.n. (B); S. Berggren s.n. [Oct. 1874] (Lu, Us), s.n. [Taheke, Nov. 1874] (Lu, S); Brintnall s.n. [Fr. Thames River, 1914] (K); E. Cheesman s.n. [Auckland Harbor] (Cb), s.n. [1874] (Lu); Collector undesignated s.n. (F--362766, Vu, X); A. Cunningham 107 (K), 389 (K); Drake 23 (B); Forster 117 (Mu--1078), s.n. [Herb. Pallas] (Bm--isotype, N--photo of type, Th--type, Z--photo of type); Herb. Moricand s.n. (Cb); Hillebrand s.n. (B); J. D. Hooker s.n. [Nov. Zeland] (B, P); Httgel s.n. (V, V); Kirk s.n. [North Island] (E--118610, F--355703); Lesson s.n. (Dc, V); Lynd s.n. (Bm); Mackie s.n. [Hobson Bay, 28/11/31] (Ca--583290); Meebold 5233 (Mu, N, N--photo, Z--photo); L. B. Moore 19161 (Z); Myers 10907 (Bm); Petrie 74 (Na--10711); Philson 276 (H--56495); Raoul 118 (P), s.n. [1843] (Le), s.n. (B, Cb, Dc--933, K); A. Richard s.n. (P); Setchell & Setchell s.n. [Auckland Prov., Mar. 22, 1927] (Ca--313542); United States Expl. Exped. [Wilkes] s.n. (T). Rangototo Island: H. Powell s.n. [18.12.1949] (Ut--82434b); Sledge 103 (It). LOCALITY OF COLLECTION UNDESIGNATED: Herb. Thibaud s.n. (Dc). MOUNTED ILLUSTRATIONS: Bauer, Icon. Nov. Holl. 961 (V), 961a (V), s.n. (V).

AVICENNIA MARINA var. RUMPHIANA (H. Hallier) Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 213--214, pl. 19. 1921.

Synonymy: Mangium album Rumph., Herb. Amboin. 3: 115--116, pl. 76. 1743. Avicennia nitida Blanco, Fl. Filip., ed. 1, 504. 1837 [not A. nitida Jacq., 1760, nor L. & Jacq., 1783, nor Rodsch., 1844, nor Sessé & Moc., 1894]. Avicennia tomentosa Blanco, Fl. Filip., ed. 2, 353. 1845 [not A. tomentosa Blume, 1918, nor R. Br., 1851, nor Jacq., 1760, nor L., 1826, nor L. & Jacq., 1783,

nor G. F. W. Mey., 1818, nor Nutt., 1947, nor Nutt. & Br., 1832, nor Roxb., 1835, nor Schau., 1940, nor Sieber, 1844, nor Sw., 1864, nor Vahl, 1921, nor Weigelt, 1851, nor Willd., 1822]. Avicennia officinalis Schau. ex Miq., Fl. Ind. Bat. 2: 912, in syn. 1856 [not A. officinalis L., 1753, nor H. J. Lam, 1940, nor Maxim., 1932, nor Millsp., 1930]. Avicennia rumphiana H. Hallier, Meded. Rijksherb. Leiden 37: 89. 1918. Avicennia marina var. intermedia Bakh. ex Moldenke, Prelim. Alph. List Invalid Names 5, in syn. 1940 [not A. marina var. intermedia (Griff.) Bakh., 1921]. Avicennia marina var. obovata Bakh. ex Moldenke, Résumé 235, in syn. 1959.

Literature: Rumph., Herb. Amboin. 3: 115--116, pl. 76. 1743; Blanco, Fl. Filip., ed. 1, 504 (1837) and ed. 2, 353. 1845; Miq., Fl. Ind. Bat. 2: 912. 1856; Hassk., Neue Schlüss. 57. 1866; Blanco, Fl. Filip., ed. 3, 2: 289, pl. 73. 1878; Schimper, Pflanzengeogr. 429, fig. 222. 1898; Karst. & Schenck, Veget.-Bild. 2: pl. 10. 1904; E. D. Merr., Interpret. Rumph. Amboin. 456. 1917; H. Hallier, Meded. Rijksherb. Leiden 37: 89. 1918; H. J. Lam, Verbenac. Malay. Arch. 341--344. 1919; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 205 & 213--214, pl. 19. 1921; Hill, Ind. Kew. Suppl. 6: 23. 1926; Moldenke, Alph. List Common Names 3 & 7. 1939; Moldenke, Geogr. Distrib. Avicenn. 33 & 34. 1939; Moldenke, Prelim. Alph. List Invalid Names 5, 6, & 32. 1940; Moldenke, Alph. List Invalid Names 5 & 33. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 61, 65--68, & 86. 1942; Moldenke, Phytologia 2: 92. 1944; Lam & Meeuse, Blumea 5: 235. 1945; Moldenke, Alph. List Cit. 1: 4, 16, 49, 52, 107, 120, 131, 137, 161, 191, 200, 208, 254, 312, 315, & 316 (1946) and 2: 354, 416, 423, 424, 438, 462--464, 500, 501, 558, 608, 615, & 630. 1948; H. N. & A. L. Moldenke, Pl. Life 2: 79--80. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 139, 140, 146, 148, 150, & 174. 1949; Moldenke, Alph. List Cit. 3: 670, 727, 728, 739, 758, 810, 838, 855, 858, 874, 886, 894, & 903 (1949) and 4: 1027, 1028, 1033, 1037, 1039, 1040, 1070, 1094, 1100, 1105, 1110, 1115, 1122, 1123, & 1154. 1949; Moldenke, Phytologia 4: 84 & 85 (1952) and 4: 192, 195, & 196. 1953; Moldenke, Résumé 179, 182, 186, 194--196, 198, 200, 203, 235, 236, 319, & 440. 1959; Moldenke, Résumé Suppl. 1: 13 & 14. 1959; Moldenke, Résumé Suppl. 2: 7. 1960.

Illustrations: Rumph., Herb. Amboin. 3: pl. 76. 1743; Blanco, Fl. Filip., ed. 3, pl. 73 [as A. tomentosa]. 1878; Schimper, Pflanzengeogr. fig. 222. 1898; Karst. & Schenck, Veget.-Bild. 2: pl. 10. 1904; H. J. Lam, Verbenac. Malay. Arch. pl. 3, E & F. 1919; Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: pl. 19. 1921.

This variety differs from the typical form of the species in the leaf-blades being obovate or rarely almost oblong, rather large, almost identical to those of A. officinalis L., widest above the middle, 2 or 3 times as long as wide, obtusely rounded at the apex, attenuate at the base, 5--10 cm. long, 2.5--5 cm. wide, yellowish beneath in drying, the petioles 1.5--3 cm. long, the panicles small and leafy, the bracts foliaceous, and the ovary subpilose.

Bakhuizen van den Brink says that the most conspicuous differences by means of which this variety may be distinguished from A. officinalis are: branchlets, petioles, underside of midribs, peduncles, and other parts covered by a thick gray down, small foliose inflorescences without warty glands and consisting of small capitate cymes which are often arranged in pairs in the leaf-axils, and especially small flowers with their styles short or subobsolete, well-developed stigmas curved outwards, and the ovary glabrous at the base.

Collectors describe it as a shrub or small tree, to 15 m. tall, with a trunk to 7.5 cm. in diameter at breast height and a circumference of 60 cm.; branchlets grayish-green, tomentose; leaves dull-green above, light greenish-yellow beneath; calyx light-green; corolla yellow or dirty-orange, paler outside; stamens brown; style dark-violet; ovary light-green; fruit subcordate, 2.5 cm. long, 1.2 cm. in diameter, dropping into the water and scattered by the current.

It is said to be very common in tidewater swamps by streams in Mindanao, in brackish water in Luzon, a beach tree along tidal streams in Mindoro, very frequent in high mangrove forests in Karakalang, and common along muddy seashores and tidal streams in British North Borneo. In general, it is found along sea-beaches, ascending to 10 m. altitude on Morotai. It has been collected in anthesis from January to June, and in fruit in April. Specimens have most frequently been misidentified as A. officinalis L., while Loher 14879 was misidentified as A. lanata Ridl.

Hasskarl, in the reference cited above, says that Mangium album Rumph. is a combination of A. officinalis L. and A. alba Blume. Merrill, in his Interpret. Rumph. Amboin. 456 (1917) reduces it to A. officinalis, but goes on to say that this species is found "throughout the tropics of the Old World", so obviously has confused it with A. marina and its several varieties.

Vernacular and common names include "affi-affi", "api", "api-api", "api-api puteh", "bunalun-babay", "bungalol", "bungalon", "bunglo", "caju-api-api", "cuban", "dalfta", "fika-fika", "fika-fika", "karoaj", "mangi-mangi poeti", "miapi", "piapi", "pipisic", "saoentapi", and "watta cumban". It is worthy of note that the names "api-api" and "fika-fika" are also applied to the typical form of A. marina (Forsk.) Vierh., while "api-api puteh" is applied to A. marina (Forsk.) Vierh., A. lanata Ridl., and A. officinalis L.

In all, 152 herbarium specimens, including the types of most of the names involved, and 3 mounted photographs and illustrations have been examined.

Citations: MALAYA: Penang: Wallich 1742, in part (Cb). Singapore: Hombroen s.n. (P); E. J. Schmidt s.n. [Singapore, 1/4/1900] (Cp, S); Watson & Burkill 3795 (Bz--17106). PHILIPPINE ISLANDS: Busuanga: H. N. Curran s.n. [Herb. Philip. Forest Bur. 3536] (Bz--17094). Jolo: Klemme s.n. [Herb. Philip. Forest Bur. 19521] (Cm, F--425080, Gg--31950). Leyte: Wenzel 1295 (Bm, Cb, E--

801684, F--440927). Luzon: Agama s.n. [Herb. Philip. Forest Bur. 19464] (Cl); Ahern 116 (B, W--445113, W--445642), 148 (B, Bz--17095, W--445114, W--445643), 1164 [116Q] (Bz--17092); J. Clemens s.n. [Pangasinan Prov., Dec. 1928] (Ca--374852); M. K. Clemens s.n. [Pangasinan Prov., Dec. 1928] (Ca--374852); H. Hallier 3522 (Le); Loher 4450, in part (B, Cl, Cl, K, N--photo, Z--photo); E. D. Merrill 1758 (B, W--436709), 2038 (B, Cl, K, W--436991), Sp. Blanc. 583 (B, Bm, Bz--17088, Cl, E--866157, F--482683, Le, P, V, W--904260); Perrottet s.n. [Manila, 1809] (Le), s.n. [Manila, 1819] (Cb, Cb); M. Ramos s.n. [Herb. Philip. Bur. Sci. 4954] (Bz--17096); S. Vidal y Soler, Com. Fl. Forest. Filip. 497 (K, Le); Warburg 13912 (B); H. N. Whitford 579 (W--851683), 1265 (B, K, W--852036). Marinduque: Rosenbluth s.n. [Herb. Philip. Forest Bur. 12170] (Cl). Mindanao: Babaran s.n. [Herb. Philip. Forest Bur. 26140] (Bm); Bolster 399 (Ca--239722); Elmer 10451a (Bm, Bz--17091, Cb, Cl, E--118600, Ed, F--290805, Le, V, Vt, W--779312), 12006 (Bm, Bm, Bz--17093, Cb, Cl, E--118602, Ed, F--291324, Le, Ut--28976, V, Vt, W--779707); Ferraris & Stadtmiller s.n. [Herb. Philip. Forest Bur. 20800] (Cm, E--756209, F--422966, Vt, W--900516); D. P. Miranda s.n. [Herb. Philip. Forest Bur. 18272] (Bz--17089, Ed); Quadras 407 (W--1584704); Whitford & Hutchinson s.n. [Herb. Philip. Forest Bur. 9428] (E--118604). Mindoro: M. T. Cruz 147 (Ur); Kienholz 396 [Herb. Philip. Bur. Sci. 15420] (Ur); E. D. Merrill 2161 (B, W--437109), 2380 (B, K, W--437336). Negros: H. M. Curran s.n. [Herb. Philip. Forest Bur. 19385] (Bz--17090, Le). Panay: Sandique s.n. [Herb. Philip. Forest Bur. 25817] (F--483358). RIOUW ARCHIPELAGO: Doerian: Rachmat 32 (Bz--17105, Le). BRITISH NORTH BORNEO: Cuadra s.n. [Herb. North Borneo Forest Dept. A.3187] (S). CELEBES: Bish 34 [Boschproefst. BB.16715] (Bz--17098); Boer 32 [Boschproefst. BB.3637] (Bz--17101, Le); Kjellberg 525 (Bz--17100, S); H. J. Lam 2675, in part (B, K, Le); J. G. F. Riedel s.n. [Gorontalo] (V); Soekarman 40 [Boschproefst. BB.17196] (Bz--17099); Waturandang E.80 [Boschproefst. BB.18698] (Bz--17097). TALAUT ISLANDS: Karakalang: H. J. Lam 2675, in part (Bz--17103, Bz--17104). MOENA ISLAND: Waturandang 257 [Boschproefst. BB.21795] (Bz--17102). LESSER SUNDA ISLANDS: Soemba: Kornassi 939 (Bz--17083, Bz--17084). MOLUCCA ISLANDS: Amboina: C. B. Robinson, Pl. Rumph. 301 (Bz--17082, K, Le, P, W--654619). Buru: De Vriese & Teijsmann s.n. [Buruh] (Le, Le, Le, Le). Ceram: Rutten 939 (B, Le, P, Ut). Halmahera: Forsten s.n. [Gilolo] (Le--908265--626). Little Ceram: Forsten s.n. (Le--908267--690). Morotai: Main & Aden 1618 (Bz--72704, Ng--16926). Ternate: Bequin 933 (Bz--17085). Island undetermined: Collector undesignated s.n. [Molucca] (Le); Herb. Forster s.n. [Molucca] (Le). NEW GUINEA: Avi Island: Warburg 21182, in part (B). Japen Island: Aet & Idjan 706 (Bz--72747), 972 (Bz--72744). Northeastern New Guinea:

Herb. New Guinea Forest Dept. 2404 (Ng—6500). Rombobo Island: Teijsmann 7795 (Bz—17086, Bz—17087). Vurara Island: Waterhouse 313 [Yale Herb. 28608] (F—752689, N). Locality undetermined: Zippelius 59a (Le). LOCALITY OF COLLECTION UNDETERMINED: Labillardier s.n. [1806] (Dc); Warburg 18074 [Küste Batchran] (B).
MOUNTED ILLUSTRATIONS: Blanco, Fl. Filip., ed. 3, pl. 73 (Mu).

AVICENNIA MIOCENICA Berry, Bull. Torrey Bot. Club 63: 65, pl. 3, fig. 1—3. 1936.

Literature: Berry, Bull. Torrey Bot. Club 63: 65, pl. 3, fig. 1—3. 1936; Moldenke, Geogr. Distrib. Avicenn. 41. 1939; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 75 & 86 (1942) and [ed. 2], 166 & 174. 1949; Moldenke, Résumé 226 & 440. 1959.

Leaves under the average size of those in A. germinans (L.) Stearn, variable in form, narrowly ovate or broadly lanceolate to sometimes subobovate, acuminate to bluntly pointed at the apex, rounded to rather narrowly cuneate at the base, entire, coriaceous, 7.5—8 cm. long, 1.75—2.6 cm. wide; midrib stout and prominent; secondaries numerous, stout, subparallel, camptodrome, their angle of divergence dependent on the form of the blade; tertiaries mostly obsolete. The petiole is not preserved.

The type was collected at Station 27 N, 2 E, on the De Mares concession, in the Magdalena valley, Santander, Colombia, in rocks of Miocene age.

AVICENNIA NITIDIFORMIS Berry, U. S. Geol. Surv. Prof. Paper 91: 347—348, pl. 107, fig. 4. 1916.

Literature: Berry, U. S. Geol. Surv. Prof. Paper 91: 347—348, pl. 107, fig. 4. 1916; Moldenke, Geogr. Distrib. Avicenn. 41. 1939; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 75 & 86. 1942; H. N. & A. L. Moldenke, Pl. Life 2: 42. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 166 & 174. 1949; Moldenke, Résumé 226 & 440. 1959.

Illustrations: Berry, U. S. Geol. Surv. Prof. Paper 91: pl. 107, fig. 4. 1916.

Petioles short, stout; leaf-blades medium-sized, coriaceous, lanceolate in general outline and mostly somewhat falcate and consequently slightly inequilateral, about 8 cm. long, the maximum width at or slightly below the middle about 2.1 cm., mostly widest at the middle and tapering to both ends, narrowly rounded at the apex, cuneate at the base, entire, often irregularly curved; midrib stout, prominent beneath; secondaries stout, 9 or 10 pairs, subprominent, diverging from the midrib at 35—40° angles, ascending with but slight curvature close to the margins, where they turn upwards rather abruptly to join the secondary next above and thus collectively form a pseudoacrodrome marginal vein along each margin; tertiaries immersed in the leaf-substance.

The type of the species was collected by Edward Wilber Berry in the Holly Springs sand at Early Grove, Marshall County, Mississippi, of Eocene age, and is deposited in the United States National Museum at Washington. The collector says that the

species is not common in the material thus far uncovered. He states that "It may be matched with some of the leaves of the existing A. nitida and in connection with the fruits from Puryear, Tennessee, described at A. eocenica, renders the generic determination reasonable conclusive.....All the existing species are inhabitants of tidal muddy shores and are cosmopolitan in tropical regions. One species, Avicennia nitida, reaches the Florida coast. Its leaves exhibit considerable variation, both in size and outline, ranging from small obovate to lanceolate and lanceolate-elliptical forms, which may be rounded or acuminate distad. Among numerous leaves of this species the fossil is nearer to the average form of the existing species than to any of its variants. It agrees rather closely in size, outline, and venation with this mean form, but is relatively slightly narrower."

AVICENNIA OFFICINALIS L., Sp. Pl., ed. 1, 1: 110. 1753 [not A. officinalis H. J. Lam, 1940, nor Maxim., 1932, nor Millsp., 1930, nor Schau., 1856].

Synonymy: Anacardium orientale Houst., Dendr. 156. 1662. Oepata Rheede, Hort. Malab. 4: pl. 45. 1683. Avicennia tomentosa Willd., Sp. Pl. 3 (1): 395. 1800 [not A. tomentosa Blanco, 1845, nor Blume, 1918, nor R. Br., 1851, nor Jacq., 1760, nor L., 1821, nor L. & Jacq., 1783, nor G. F. W. Mey., 1818, nor Nutt., 1947, nor Nutt. & Br., 1832, nor Schau., 1940, nor Sieber, 1844, nor Sw., 1864, nor Vahl, 1921, nor Wall., 1851, nor Weigelt, 1851]. Avicennia oepata Hamilt., Trans. Linn. Soc. Lond. Bot. 17: 221. 1835. Avicennia tomentosa Roxb. ex Hamilt., Trans. Linn. Soc. Lond. Bot. 17: 221, in syn. (1835); Watt, Dict. Econom. Prod. Ind. 1: 361. 1839. Avicennia tomentosa var. asiatica Walp., Repert. Bot. Syst. 4: 133. 1845. Avicennia obovata Griff., Notul. Plant. Asiat. 4: 189. 1854. Avicennia oepata Buch.-Ham. ex Jacks., Ind. Kew. 1: 254. 1893. Avicennia officinalis var. tomentosa Cowan, Rec. Bot. Surv. India 11: 199 & 220. 1928. Avicennia obtusifolia Wall. ex Moldenke, Prelim. Alph. List Invalid Names 5, in syn. 1940. Avicennia officinalis L. ex Moldenke, Suppl. List Invalid Names 1, in syn. 1941. Avicennia affinalis L. ex Moldenke, Alph. List Invalid Names Suppl. 1: 2, in syn. 1947. Avicennia oepata Buch. ex Moldenke, Alph. List Invalid Names Suppl. 1: 2, in syn. 1947. Avicennia officinale L. ex Moldenke, Résumé Suppl. 2: 8, in syn. 1960. Avicennia officinalis Blume ex Moldenke, Résumé Suppl. 2: 8, in syn. 1960.

Literature: Houst., Dendr. 156. 1662; Rheede, Hort. Malab. 4: pl. 45. 1683; Ray, Hist. Pl. 2: 1566. 1693; Pluk., Almag. Bot. 28. 1696; Rumph., Herb. Amb. 3: 115, pl. 76. 1743; L., Fl. Zeyl. 23. 1748; L., Sp. Pl., ed. 1, 1: 110. 1753; Forst., Pl. Escul. 72--73. 1784; Willd., Sp. Pl. 3 (1): 395. 1800; Pers., Syn. Pl. 2: 143. 1807; Nutt., Amer. Journ. Sci. 5: 296. 1822; Blume, Bijdr. Fl. Ned. Ind. 14: 821. 1826; Wall., Pl. Asiat. Rar. 3: 44,

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Illustrations: Rheede, Hort. Ind. Malab. 4: pl. 45. 1683; Wall., Pl. Asiat. Rar. 3: pl. 271 [as A. tomentosa]. 1832; Wight, Ic. Pl. Ind. Or. 4: pl. 1481 [as A. tomentosa]. 1849; Wight, Illustr. Ind. Bot. 2: pl. 173 bis [as A. tomentosa]. 1850; Schnitzlein, Iconogr. 2: pl. 137** [as A. tomentosa]. 1856; Beddome, Fl. Sylv. Anal. Gen. pl. 22. 1872; Vidal, Sinop. Fl. For. Filip. Atlas pl. 75, fig. G. 1883; Treub, Ann. Jard. Bot. Buitenz. 3: pl. 14 & 15. 1883; Karst., Bibl. Bot. 5 (22): pl. 6, 8, fig. 112--118, & 10, fig. 140. 1891; Baill., Hist. Pl. 11: 88 [as A. tomentosa]. 1891; Schimp., Bot. Mitteil. Tropen 3: pl. 6, fig. 2 & 3 [as A. tomentosa]. 1891; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 181 [as A. tomentosa]. 1894; Schimp., Pflanzen-Geogr. fig. 224. 1898; Talbot, For. Fl. Bombay 2: 362. 1911; Wettstein, Handb. Syst. Bot., ed. 2, 739 [as A. tomentosa]. 1911; Koord. & Val., Atlas Baumart. Java pl. 273 & 274. 1914; Basu, Ind. Medic. Pl. pl. 748. 1918; W. H. Br. & A. F. Fischer, Bull. Philip. Dept. Agr. Bur. Forestry 17: pl. 5, 37, & 38 (1918) and 22: pl. 5, 37, & 38. 1920; H. J. Lam, Verbenac. Malay. Arch. pl. 3, fig. A,

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Shrub or tree, often much branched from near the base, to 25 m. tall, mostly of poor form, sending down adventitious roots from low branches overhanging water; trunk to 1 m. in diameter, often crooked, the bole to 7 m. tall, sometimes with stilt roots on the underside of the leaning trunk; crown scraggly; wood gray, with a darker heartwood, hard, heavy, with interlocked grain and prominent ring-pores, consisting of numerous, narrow, well-marked, concentric layers, weighing 58 pound per cubic foot, very brittle, the sapwood often undefined, pale straw-colored, distinctly ring-pored, the true wood straw-color or pale straw-color, the rings about 3.5--7 mm. apart; bark birch-like, brownish-gray, thin, with no exudation, becoming rough, blackening progressively in age and loosening, or the outer bark yellowish-green and the inner bark white, about 7 mm. thick; branchlets spreading, nutant, terete, smooth, the youngest parts closely appressed-tomentellous, glabrescent in age, sparsely resinous-punctate and lenticellate; petioles medium-stout, 0.5--2 cm. long, glabrescent; leaf-blades coriaceous, obovate or broadly oblong, dark-green above, 4--12 cm. long, 2--6 cm. wide, rounded at the apex, slightly revolute along the margins, subcuneate or often rounded at the base and shortly attenuate into the petiole, glabrous and eventually shiny above and very minutely glandulose, appressed-tomentellous beneath, often fulvous in drying, resinous-punctate beneath the pubescence, bitter and somewhat salty to the taste; midrib prominent and subglabrous beneath; secondaries 5--15; veinlets obsoletely reticulate; inflorescence terminal, paniculate, bracteate, rarely subfoliose, 3--15 cm. long, 10--15 cm. wide, the panicles terminal and in the axils of the uppermost leaves, solitary or paired, pedunculate, 1--3-branched, the cymes dense, subcapitate or rarely elongate and dissitiflorous, 1--1.5 cm. long, 1--2 cm. wide, consisting of 2--12 decussate flowers; peduncles green or subfuscous, obsoletely tetragonal, densely appressed-furfuraceous, subglabrescent in age, densely resinous-punctate and densely verruculose with elevated glands; bracts small, sessile, rounded-ovate, densely tomentose from the base to the middle, glabrate toward the apex, green, soon blackening, scarious, caducous; bractlets two, 3--5 mm. long, rounded-ovate or subreniform, obtuse at the apex, resinous-punctate on both surfaces, ciliate-margined, rugose beneath and densely tomentellous from the base to the middle, glabrate toward the apex, rather shiny, glabrous on the upper surface or white-pilose toward the base; flowers sessile, large, unpleasantly scented, said to be narcotic, 7--10 mm. long, 12--15 mm. wide; calyx persistent, large, the lobes rather unequal, rounded-ovate, 5--6 mm. long, 3--5 mm. wide, subtrinnerved, densely ciliate-margined, sparsely resinous-punctate on both surfaces, soon scarious, glabrous and shiny above, rugulose and green beneath, densely white-tomentellous toward the base beneath but glabrous toward the apex; corolla large, yellow or yellow-brown, soon becoming almost orange-colored, rather thick-textured, dropping off

after anthesis, the tube campanulate, equaling or slightly exceeding the calyx, 2--4 mm. long, glabrous on the outside, its throat 5--6 mm. wide, the lobes rather unequal, rather obtusely oblong or ligulate, spreading in radial fashion, 3--5 mm. long and wide, retuse, the posterior one patent and broader, with its apex incised, the 3 anterior ones very patent or reflexed, glabrous on the inner surface, very densely whitish-villosulous on the outer surface, but glabrous on the margins; stamens short-exserted, shorter than the corolla-lobes, 2--4 mm. long; filaments much longer than the anthers; anthers broadly oblong, fulvous, soon becoming pitch-black, 1--1.2 mm. long, the pollen white; ovary conic, completely covered with long, whitish, appressed hairs, densely resinous-punctate; style filiform, elongate, almost completely short-tomentellous with white hairs, resinous-punctate, subappressed to the corolla-tube, scarcely exerted, excrescent after anthesis and long-exserted from the calyx, 3--4 mm. long; stigma subtabescent, unequally and acutely bifid, incurved; fruit large, greenish-purple, broadly ovate or amygdaloid, rounded or subcordate at the base, compressed laterally, increasing in size after being shed, germinating only in water; cotyledons large and thick, almost always very densely long-setose, developing into medium-sized seed-leaves that are narrowly lanceolate and attenuate-acute at both ends, green or mostly greenish-purple; hypocotyl at the most only half as long as the inner cotyledon, pubescent for only a short distance, the side-rootlets and plumule conspicuous even in the fruit.

This is the type species of the genus, and is found in salt-marshes and tidal forests, at river mouths, and along seashores from India, East Pakistan, Tenasserim, the Andaman Islands, and Ceylon through the coasts of Indochina, Thailand, and Malaya to the Philippines, Sumatra, Madura, Java, Borneo, Celebes, the Lesser Sunda Islands, Molucca Islands, and New Guinea, south to New South Wales.

Vernacular names reported for it are "afi-afi", "api-api", "api-ápi", "api-api brajoe", "api-api daun bebar", "api-api katjang", "api-api-katjang", "api-api ludat", "api-api puteh", "api-ragajoe", "appi-appi", "baen", "bani", "bara baen", "bien", "bina", "bind", "black mada", "bogem", "bogem", "bunalun-lalague", "bungálon", "bufugálon", "byna", "caju cantekka", "calapini", "carils", "cây móm", "cheria", "cheriá", "efi", "hapi-hapi", "hapi-hapi-brajoe", "kajoe-api-api", "kajoe doedoek", "kajoe kéndéka", "kajoe kendeka", "kajoe kéndéka", "kajoe ting", "kandalu", "kanna", "ki balanak", "kibalanak", "ki blanak", "kokidi", "lame", "lameb", "la-met", "lamet", "ludat", "mada", "mada-chettu", "manggi-manggi poetih", "metbin", "miápi", "nala mada", "nala-mada", "nalla", "nalla mada", "nalla-mada", "oepali", "oepata", "orei", "palátuvier", "pe-ape", "pè-apè", "pepe pepe", "pèpè pèpè", "piápi", "pipisic", "saladillo", "salgueira", "sammaek ruaek-wum", "tamelhèè", "thamé", "tiabaen", "timmer", "tioes lewo", "tivar", "udat", "upputti", "wata koemban", "white api-api", "white mangrove", and "zoutboom".

The name "Avicennia officinalis" has been very widely misap-

plied by authors and by herbarium workers, resulting in great confusion in literature and herbaria. Foxworthy, for instance, says that A. officinalis can scarcely be distinguished from A. alba Blume, while Lam actually places A. alba in the synonymy of A. officinalis. Actually, these two species are the most uniformly distinct taxa in the entire genus, and it seems inconceivable that they should be confused with each other! It is most probable that these authors based their concept of the two species on misidentified herbarium specimens, without consulting the types. Most authors on the African flora, as well as those writing on the flora of the Seychelles, Mauritius, Madagascar, and the Arabian Peninsula (e.g., Baker, Pearson) have misapplied the name "A. officinalis" to material which actually represents A. marina (Forsk.) Vierh. Other authors, like Schauer, Domin, Foxworthy, etc., include A. marina by inference in their statement that "A. officinalis" ranges to tropical and subtropical Africa. Baker, Pearson, and others have actually extended the supposed distribution of this species to the "tropical shores of both hemispheres", thus apparently including A. marina, A. germinans (L.) Stearn, A. schaueriana Stapf & Leechman, A. bicolor Standl., and A. tonduzii Moldenke in this catch-all "species"! Houard refers to the Guiana material of A. germinans as "A. officinalis", and most of the writers on the flora of the Galapagos Islands refer to the species occurring there as "A. officinalis." Pearson included the west African A. africana P. Beauv. in the synonymy of his "A. officinalis", while Schauer included A. alba, A. marina, and A. marina var. resinifera (Forst.) Bakh. in his description and synonymy. Some authors (e.g., Lam, Kuntze, Crevost & Pételot) reduce almost all the other known species and varieties of the genus to synonymy under A. officinalis — which is ridiculous. What Biswas calls "A. officinalis" is actually A. marina, and what he calls "A. tomentosa" is actually the real A. officinalis.

Lam, in his Verbenac. Malay. Arch. pl. 3 (1919), illustrates the leaves of various forms of Avicennia under the collective name of "A. officinalis". In my opinion, his figs. A, B, C, and H represent A. officinalis, his figs. D, G, J, and K are A. marina, figs. E. and F are A. marina var. rumphiana (H. Hallier) Bakh., figs. L, P, Q, R, S, T, and U are A. eucalyptifolia Zipp., and figs. M, N, and O are A. alba.

Miquel, on page 912 of the 1856 reference cited above, includes in the synonymy of A. officinalis the following binomials: Mangium album Rumph., A. officinalis Schau., A. resinifera Forst., A. tomentosa R. Br., and A. eucalyptifolia Zipp. Of these, I regard the first two as synonyms of A. marina var. rumphiana, the next two as synonyms of A. marina var. resinifera, and the fifth as a valid species.

Pearson, on page 226 of the 1910 reference cited above, in-

cludes A. resinifera Forst., A. tomentosa Jacq., A. tomentosa var. arabica Walp., A. africana P. Beauv., and A. meyeri Miq. in the synonymy of this species! Of these, the first is now regarded as A. marina var. resinifera, the second and last are A. germinans, the third as A. marina, and the fourth is a valid species.

Schauer in Mart., Fl. Bras. 9: 306 (1851) includes A. resinifera Forst., A. tomentosa R. Br., A. alba Blume, Sceura Forsk., Halodendron Thou., Halodendron thouarsii Roem. & Schult., Oepata Rheede, Mangium album Rumph., Rack Bruce, A. tomentosa Wall., and A. tomentosa Sieber in the synonymy of "A. officinalis", all of which names, with the exception of Oepata, actually belong elsewhere!

Miss Greene in Kew Bull. 1935: 509 (1935) makes the remarkable statement that "Recently Ewart and Davies, Fl. N. Territory, p. 239 (1917) have reduced T. subacaulis F. Muell. to Avicennia officinalis L." Actually, they do no such thing in the reference cited! They merely state there that Tatea subacaulis ["acaulis" is a misspelling] has been recorded from "Northern Australia", but that no actual specimens from the Northern Territory were seen by them to verify this record.

The name "A. tomentosa Willd." is given by Nuttall, Amer. Journ. Sci. 5: 296 (1822), as a valid name, but actually applies to A. germinans.

According to Stearn, on page 35 of the 1958 work cited above, "The name A. officinalis L. is to be typified by the Indian plant which is represented as 'Oepata' in Rheede's Hortus Indicus Malabaricus 5: t. 45 (1683), the restricted type-locality for this being the coast of Cochin, southern India." On the Kew sheet of Thwaites 1961 Otto Stapf has written "an excellent match of the specimen in Herb. Linn." The type of A. obtusifolia is Wallich s.n. [Sunderabund & Insula Gangis] in the Copenhagen herbarium.

Houard, in the reference cited above, says that "A. officinalis" is infested with the galls of an undetermined insect in Guiana, but this statement undoubtedly refers to A. germinans.

Watt describes A. officinalis as a small tree or shrub of the salt-marshes and the tidal forests of India, Burma, and the Andaman Islands. He affirms that it is found "everywhere" in the Sunderabans, often becoming a tree of considerable size, while on the Coromandel coast it is only a bush. Roxburgh says that it is common near the mouths of rivers where the spring tides rise, that it is "common" in India in low places near the mouths of rivers and in salt-marshes. In the lower parts of the Delta of the Ganges it grows to be a tree of considerable magnitude and is "abundant on the Bombay and Malabar coasts". It is not certain, however, how much of this description actually applies to this species and how much to A. marina. Kurz reports A. officinalis as frequent along the Burmese coast from Chittagong to Tenasserim.

Birdwood reports that the bark is used as a tanning agent in Bombay, while Drury says that the ashes of the wood are used to wash cloth. Watts maintains that the roots possess aphrodisiac properties, while the unripe seeds are used as a poultice to hasten suppuration of boils and abscesses. Hill states that the "Dhobies in the Madras Presidency use the ashes of the wood for washing and cleaning cotton cloths. It is also used in small-pox. The bark is used in Rio de Janeiro for tanning." Dymock says "the bark is astringent", while Gidie reports "bark astringent, ashes used for washing and bleaching cloth; common in Madras". Watt describes the "kernels" as bitter, but edible; the very brittle wood used in India only for firewood. Ford, however, asserts that the wood is used for mills for husking paddy, rice-pounders, and oil-mills in the Andaman Islands. Rheede says that the ashes obtained by burning the wood and the fruit are used in Malabar for bleaching clothes, and are used by painters "for mixing their colors". The astringent bark is used in Bombay and Sind for tanning purposes. The fruit is eaten "everywhere" after a preliminary preparation, generally by cooking or soaking it in water for a long period of time and then often drying it in the sunshine to rid it of its bitterness. Rheede also reports that the seeds are cooked with the leaves of Ipomoea campanulata L. and with butter, and from this an ointment is made for the "ripening" of pimples and tumors. The wood is employed as piling for wharves. In Celebes it is used for building houses, but is only durable enough for the interiors. In seawater it is said to be virtually indestructible, which fact makes it useful for the building of small boats. In Java the trunks are used to make rice-blocks. In Celebes the black heartwood of old trees is powdered and used as an ointment in the treatment of headaches.

Because of the mixup of A. marina with A. officinalis in literature and herbaria, the descriptions of the latter species as given by most authors are either entirely erroneous (applying entirely to A. marina) or are a composite of the characters of both species. Watt, for instance, says that the style is very short in "A. officinalis" and is long and slender in "A. tomentosa". His "A. officinalis" is apparently actually A. marina, while his "A. tomentosa" is in reality the true A. officinalis.

Lam in Bot. Jahrb. 59: 29 (1925) records Volken 193 from Yap, but I have not as yet seen this collection. It is more probably A. alba, which is the only species of the genus known to me from the Caroline Islands. He describes "A. officinalis" as being found "in Flussmündungen und am Meeresstrande in Ostafrika, Asien, Australien, Neu-Seeland, Polynesien, in tropischen und subtropischen Gebieten als ein Element der Mangrove-Formation." He obviously has confused the species here with A. marina, as he has also done in his Verb. Malay. Arch. 340—344. (1919).

The Balansa 1337, Petrie 8316, and United States Expl. Exped. [Wilkes] s.n. [Sydney], all previously regarded by me as being A.

officinalis, are actually A. marina var. resinifera, while Warburg 17522, previously thought to represent A. lanata, seems actually to be A. officinalis. The Herb. Peradeniya 523 specimen cited below is not typical -- it may represent an as yet undescribed variety. Yates 2075 in the University of California herbarium has a photograph attached showing a close-up view of the twigs and flowers. The species is recorded from the Salajar Islands in Blumea 2: 262 (1937).

J. G. Baker, in the 1894 reference cited above, says that A. officinalis is found in "mangrove swamps from Polynesia to East Tropical Africa, constantly associated with Rhizophora mucronata." He is referring here, in part, at least, to A. marina. In his 1877 work he records A. officinalis from Mahé and Praslin, in the Seychelles Islands, but here, again, the plant referred to is actually A. marina. The MacOwan 1941 and 3203, Drège s.n., Krauss 241, Sanderson 886, Plant 21, Wood 395 and 1360, Wilms 2229, Rehmann 9004, Cooper 1233, Peddie s.n., and Junod 500, all cited by Pearson on page 226 of the 1910 reference listed above from the Union of South Africa are all A. marina. He says that A. officinalis is found "on the tropical shores of both hemispheres", which, of course, is not true! It is actually found only from India and East Pakistan to New Guinea and Australia. It is not found at all in the Western Hemisphere. Similarly, the Slade 2, Steudner 1307, Bent s.n., Ehrenberg s.n., Quarton-Dillon s.n., Hildebrandt 731 and 1241, Schweinfurth & Riva 61, Beccari s.n., Playfair s.n., Terracciano s.n., Wakefield s.n., Volken 160, Holst 3059, Kirk 11, 45, and s.n., and Peters s.n., all cited by Baker in Thiselt-Dyer, Fl. Trop. Afr. 5: 332 (1900) are A. marina. He erroneously claims that A. officinalis grows "also in Egypt, Natal, and the tropical shores of both hemispheres". The Collector undesignated s.n. in the Buitenzorg herbarium is a mixture with A. alba, while Teijsmann 1753 H.B. in the same herbarium is a mixture with A. marina.

Crevost & Pételot, in the reference cited above, include the following binomials in the synonymy of A. officinalis: A. tomentosa Jacq., A. africana P. Beauv., A. alba Blume, A. elliptica Thunb., A. floridana Raf., A. intermedia Griff., A. lamarckiana Presl, A. meyeri Miq., A. oblongifolia Nutt., A. obovata Griff., A. cepata Buch., and A. resinifera Forst., many of which actually represent entirely different taxa.

Hooker, in his Handb. New Zeal. Fl. 224 (1864) recorded "A. officinalis" from "Chatham Island" on the authority of Dieffenbach. According to Cheeseman, Man. New Zeal. Fl., ed. 2, 765 (1925) this is an error based on a sterile specimen of Olearia traversii F. Muell.

The true Avicennia officinalis has been collected in anthesis in April, June, July, August, and December, and in fruit from

May to September. It is probable that it flowers and fruits practically throughout the year. It ascends to 50 meters altitude in Papua. Brass states that it "sends down adventitious roots from low branches overhanging water", while Jackson & Hart definitely assert that there are stilt-roots on the underside of leaning trunks. This is an unusual condition for the genus. Usually it is members of the genus Rhizophora, regularly growing in association with Avicennia, which exhibit the stilt roots. Aet & Idjan describe the flowers as "green", but surely in error. Herbarium material has been misidentified by herbarium workers as A. alba Blume, A. germinans L., A. tomentosa L., Bontia germinans L., and even as Acrotrema costatum Jack.

Briquet, in the reference cited above, quotes Schimper, "der diese Arten in situ genau studiert hat", as saying that the three species which he recognizes can be distinguished as follows:

1. Flowers white; fruit germinating on the tree; hypocotyl almost as long as the inner cotyledon, pubescent almost its whole length, mostly without visible side-rootlets in fruit; plumule not visible with the naked eye.
2. Stigmas sessile; corollas glabrous on the inner surface..
A. schaueriana.
- 2a. Pistil as long as the stamens; corolla pubescent within....
A. germinans.
- 1a. Flowers ocher-yellow; fruit germinating only in water; hypocotyl at most only half as long as the inner cotyledon, pubescent for only a short distance; side-rootlets and plumule conspicuous even in fruit.....A. officinalis.

Schimper obviously includes A. africana in A. germinans, and A. marina in A. officinalis.

In all, 409 herbarium specimens, including the types of all the names involved, and 10 mounted photographs and illustrations have been examined.

Citations: INDIA: Bombay: Gammie s.n. [Bassein, Aug. 1905] (Bm), s.n. [Bassein, Aug. 1908] (K, K); Hohenacker 68, in part (B, B, Cb, Cb, Cp, K, Le, Mu—1079, P, Us, Ut, V, V, X); W. A. Talbot 531 (Cl, Dd, K, N). Madras: Beddome 6535 (Bm); Collector undesignated s.n. [Porto Novo] (K); Cornwell 4 (Dd, Dd); Foulkes 104 (Cl); Gamble 18211 (Bm); Rottler s.n. [Trankenbar] (Mu—1458); R. Wight 770 (Ed), 2599, in part (Ed, Ed). Orissa: Mooney 3347 (N). Travancore: Bourdillon 262 (Cl), s.n. (Cl); Gamble 14764 (K); Rama Rao 1145 (Dd); R. Wight 2328 (Cl, K, Le). United Provinces: Herb. Forest Research Inst. Dehra Dun 4357 (A, N, Y), 4359 [2] (N). West Bengal: Biswas 790 (Cl); C. B. Clarke 8470 (Bm, Cl), 21660 (Cl, W—802813), 21660b (Bm); J. M. Cowan 35 (Ed), 512 (Ed), s.n. [11/4/27] (Ed); Haines 4161 (K); F. Hamilton 1364 (Ed); Heinig 65 (B, Dd, N), s.n. (Cl); Hooper 12543 (Cl), s.n. [G. H. Watt 12543] (Ed); Janardan s.n. [June 14,

1899] (W--516517), s.n. [Matla] (Cl, Cl, Dd); Kurz s.n. [Mutlah] (Cl); Lace 2320 (Dd, Ed, K); Nath 2 (Dd), 331 (Dd), 333 (Dd); C. E. Parkinson s.n. [Gipsah] (Dd); Prain s.n. [30 July 1902] (Dd, K), s.n. [Aug. 1, 1902] (Cl, K, W--516516), s.n. [Aug. 7, 1902] (Cl, Cl, Na--19555), s.n. [Sept. 30, 1902] (Cl); Proshad 18283 (Cl), 26744 (Ed); Sarkar I (Cl), II (Cl); Wallich s.n. [Sunderabund & Insula Gangis] (Cp). State undetermined: Collector undesignated s.n. [Takwapari, 8.7.27] (Cl); F. Hamilton s.n. [Kyeemeedam] (Em); Rottler s.n. [Ind. orient.] (Br); Roxburgh s.n. (Ed, Ed); Wallich 1184 (Dc), s.n. [Ind. orient.] (Cp), s.n. (Cp); R. Wight 81 (K). BURMA: Tenasserim: H. B. Anthony 26026 (Cl); H. Falconer 388 (Bz--17227, Bz--17228, Cb, Cl, Dd, Mu--1080, P); Helfer 6069 (Cl, K); Herb. Bot. Surv. Tenass. Circle 140 (Cl); Kurz 1025 (Cl), 1026 (Cl); Manson 406 (Cl); McLellan s.n. [Rangoon] (Ed); C. E. Parkinson 14472 (Dd), 14647 (Dd), 14999 (Dd); C. G. Rogers s.n. [Rangoon Timber Depot] (Cl, Dd, Dd); Sukoe 11020 (Dd). ANDAMAN ISLANDS: South Andaman: King's Collector s.n. [28/6/90] (Cl), s.n. [30.7.92] (Cl, Cl, Us). CEYLON: Collector undesignated s.n. (W--201660); Herb. Peradeniya 523 (N, N, N); Thwaites 1961, in part (B, B, Bm, Cb, Cl, K, P, V, V, X), s.n. (Vu). INDOCHINA: Cochinchina: Herb. Forestier s.n. (P); Pierre 478 (P, P), s.n. [2/1869] (P), s.n. [Bentre] (N), s.n. (B). State undetermined: Talmy s.n. (P, P). THAILAND: Kerr 2095 (B, Cl). MALAYA: Kedah: Boswell s.n. [Herb. Forest Dept. F. M. S. 9010] (Ed). Lumut Island: Herb. Forest Dept. F. M. S. 16709 (A, N). Malacca: Collector undesignated s.n. (Cl); W. Griffith 6069 (K, P), s.n. [Malacca, 1845] (K); Maingay 1208 (K); Sonnerat s.n. [Herb. Adans.] (P). Penang: Wallich 1742, in part (B, Cl, Dc, Dc, K). Selangor: Burkill 3129 (Bz--17226); Cubitt s.n. [Feb. 1917] (K); Herb. Forest Dept. F. M. S. 3280 (K), 36625 (N), 36626 (N), 36627 (N), 36628 (A, N), 36629 (A, N), 36630 (A, N); F. G. Utjang s.n. [Herb. Forest Dept. F. M. S. 4718] (K). Singapore: T. Anderson 79 (Cl); Collector undesignated 892 (B), s.n. (Bz--16968, E--118597); M. R. Henderson 34770 (Bz--17224, Bz--17225); Nur s.n. [Sungai Benban, May 29, 1934] (F--752071, N); H. N. Ridley 10370 (Cl), s.n. [1892] (Bm), s.n. [Singapore] (B, B, B, B, Cl). Wellesley: F. T. Brooks 16 (K). State undetermined: Herb. Forest Dept. F. M. S. 16717 [timber 2441] (Ma). PHILIPPINE ISLANDS: Luzon: Alvarez s.n. [Herb. Philip. Forest Bur. 21470] (Cl, F--422850, Vt); Cailipan s.n. [Herb. Philip. Forest Bur. 26946] (E-837082, F--484003); Elgincolin s.n. [Herb. Philip. Forest Bur. 28064] (Bz--17207); Loher 4450, in part (K); E. D. Merrill 2431 (B, K), s.n. [April 1903] (W--437538); Ocfemia s.n. [Malate, Marzo 1903] (E--1017518); Perrottet s.n. [1809] (Le); Vidal y Soler 496 (K); H. N. Whitford 588 (K, P, W--851686). Mindanao:

D. P. Miranda s.n. [Herb. Philip. Forest Bur. 24763] (E--836782, F--483300); Piper 175 (B). Mindoro: M. L. Merritt s.n. [Herb. Philip. Forest Bur. 9796] (Br, Bz--17209, E--118599). Negros: H. M. Curran s.n. [Herb. Philip. Forest Bur. 19386] (Cl, Ed). Palawan: Fénix s.n. [Herb. Philip. Bur. Sci. 15596] (B, Le); Foxworthy 761 (B, E--118598), s.n. [Herb. Philip. Bur. Sci. 761] (Bz--17208, W--627069); Manalo s.n. [Herb. Philip. Forest Bur. 7494] (B). Samar: Valderrama s.n. [Herb. Philip. Forest Bur. 25835] (E--834261). SUMATRA: Barends 36 [Boschproefst. BB.8879] (Bz--17239); Gusdorf 15 (Bz--17219); Lörzing 6028 (Bz--17218, Le); Yates 2075 (Bz--17223, Ca--300520, K, V). MADURA ISLAND: Teijsmann 1753 (Cl), 1753 H.B., in part (Bz--17037). JAVA: Backer 16736 (Bz--17114, Bz--17115, Bz--17116, Bz--17117, Bz--25461), 21442 (Bz--17131, Bz--17132, Bz--17133, Bz--17134, Bz--25465); Bakhuizen van den Brink 450 (Bz--17118, Bz--17119, Bz--17120, Bz--17121, Bz--17122, Bz--25462, Le, P, Ut), 948 (Bz--25464), 1422 (Bz--17124, Ut--24875a); Becking 8 (Bz--17129, Bz--17130); Beumée A.61 (Bz--17113); Bijhouwer 191 (Bz--17123); Collector undesignated s.n. [Java] (Le); C. W. Franck 66 [229] (Cp, W--1596613); Hoogerwerf 29 (Bz--17234, Bz--17235); Junghuhn s.n. (Le); Koorders 9677b (Le), 9678b (Le), 9693b (Bz--17191), 9697b [Boschwezen 6188t] (Bz--17195, Bz--17196), 9698b [Boschwezen 6205t] (Bz--17199), 9699b [Boschwezen 6227t] (Bz--17167), 9700b [Boschwezen 6248t] (Bz--17197, Bz--17198), 9702b (Bz--17192, Bz--17193, Le), 9703b (Bz--17194), 12726b [Boschwezen 6209t] (Bz--17200), 12851b [Boschwezen 6160t] (Bz--17178), 12852b [Boschwezen 6161t] (Bz--17179, Bz--17180), 12875b [Boschwezen 6214t] (Bz--17161), 12876b [Boschwezen 6039t] (Bz--17181, Bz--17182), 12879b [Boschwezen 6168t] (Bz--17162), 12880b [Boschwezen 6213t] (Bz--17163), 12887b [Boschwezen 6225t] (Bz--17669), 12938b [Boschwezen 6224t] (Bz--17164), 12944b [Boschwezen 6223t] (Bz--17165), 12945b [Boschwezen 6210t] (Bz--17166), 12946b [Boschwezen 6220t] (Bz--17183, Bz--25466), 13162b [Boschwezen 6034t] (Bz--17184), 20623b [Boschwezen 6223t] (Bz--17155, Bz--17156), 20624b [Boschwezen 6225t] (Bz--17157, Le), 20625b [Boschwezen 6205t] (Bz--17158, Le), 20626b [Boschwezen 6217t] (Bz--17159), 20627b [Boschwezen 6214t] (Bz--17160, Le), 20628b [Boschwezen 6227t] (Bz--17149), 20629b [Boschwezen 6209t] (Bz--17150, Bz--17151), 20630b [Boschwezen 6213t] (Bz--17152, Le), 20631b [Boschwezen 6235t] (Bz--17153, Bz--17154), 20633b [Boschwezen 6224t] (Bz--17143), 20634b [Boschwezen 6242t] (Bz--17146), 20637b [Boschwezen 6210t] (Bz--17144, Bz--17145), 20683b [Boschwezen 6185t] (Bz--17147, Bz--17148), 20691b [Boschwezen 6193t] (Bz--17135, Bz--17136, Le), 20694b [Boschwezen 6183t] (Bz--17137), 20696b [Boschwezen 6182t] (Bz--17138), 20697b [Bosch-

wezen 6188t) (Bz--17139, Le), 20698b [Boschwezen 6184t] (B, Bz--17140, Ca--265977, Cl, Le), 20703b [Boschwezen 6191t] (Bz--17141, Bz--17142), 30054b [Boschwezen 6209t] (B, Bz--17185, Bz--17186), 30057b [Boschwezen 6213t] (Bz--17187, Bz--17186, Le), 30058b [Boschwezen 6205t] (Bz--17189, Bz--17190, Le), 30354b (Le), 39758b [Boschwezen 6227t] (Bz--17168), 39760b [Boschwezen 6224t] (Bz--17169), 39767b [Boschwezen 6247t] (Bz--17170), 39795b [Boschwezen 6235t] (Bz--17171), 39800b [Boschwezen 6223t] (Bz--17172), 39839b [Boschwezen 6225t] (Bz--17173), 39844b [Boschwezen 6185t] (Bz--17174), 39842b [Boschwezen 6217t] (Bz--17175), 39853b [Boschwezen 6244t] (Bz--17176), 39854b [Boschwezen 6248t] (Bz--17177); Kuntze 5928 (K); E. O. A. Nyman 70 (Us); Teijsmann 1753 H.B. (Le); Valeton s.n. [Herb. Bot. Var. 337; 227] (Bz--17127); Zollinger 2154 (B, Em, Bz--17128, Cb, Cb, P, S, X). BORNEO: Boschwezen 1979 (Le), 2366 (Bz--17110, Bz--17111, Bz--17112); H. Hallier B.271 (Bz--17109, Le); Van Ileurs 92 [Herb. Boschproefst. BB.9338] (Bz--17230). CELEBES: Boschproefst. CC.3891 (Le); Kjellberg 324 (Bz--17213, S), 530 (Bz--17210, S); Koorders 19484b (Bz--17212); J. G. F. Riedel s.n. [Gorontalo] (K); Teijsmann 13767 (Bz--17214, Bz--17215, Bz--17216, Bz--17217, Le, Le); Versteeg 5 [Herb. Boschproefst. 3891] (Bz--17211). LESSER SUNDA ISLANDS: Bali: Vogd 2152 (Bz--17201). Banka: Teijsmann s.n. [Muntok] (Bz--17220, Bz--17222). Buton: Elfert 2701 (Le). Sumbawa: Vogd 1914 (Bz--17237). MOLUCCA ISLANDS: Amboina: Herb. Ventenat s.n. (Cb); Warburg 17522 (B, N--photo, Z--photo). Halmahera: Haan 545 [Herb. Boschproefst. BB.24925] (Bz--17204). Tanimber Islands: Buwalda 118 [Herb. Boschproefst. BB.24337] (Bz--17203). NEW GUINEA: Dutch New Guinea: Versteeg 1887 (Bz--17206, Le, Ut). Japen Island: Aet & Idjan 706 (Ng--16960). Papua: Brass 1348 (B, Bz--17205, K, P); Cavanaugh 5 (Ng--6494); A. J. Hart 4530 (Ng--6502); Jackson & Hart 4528 (Ng--6501); Womersley & Simmonds 5054 (Ng, Ng--16843). LOCALITY OF COLLECTION UNDESIGNATED: *F. S! 163 (Cl); Herb. Lamarck s.n. (Cp); Herb. Linnaeus G.813, S.4 (Ls--type, M1--photo of type, N--photo of type, Z--photo of type), G.813, S.5 (I--photo of isotype, Ls--isotype, N--photo of isotype, Z--photo of isotype); Hügel 3644 (V); Warburg 5117 [Canal bei Barria] (B), 17522 (N--photo). MOUNTED ILLUSTRATIONS: Plate 5724 (N).

AVICENNIA SCHAUERIANA Stapf & Leechman ex Moldenke, Alph. List Common Names 7, 9, 13, 19--21, 28, & 33, nom. nud. (Aug. 31, 1939); Lilloa 4: 336. Oct. 11. 1939.

Synonymy: Avicennia nitida var. trinitensis Moldenke, Phytologia 1: 96--97. 1934. Avicennia tomentosa Jacq. sensu Schau. ex Moldenke, Lilloa 4: 336, in syn. 1939 [not A. tomentosa Blanco, 1845, nor Blume, 1918, nor R. Br., 1851, nor Jacq., 1760, nor L., 1821, nor L. & Jacq., 1783, nor G. F. W. Mey., 1818, nor Nutt.,

1947, nor Nutt. & Br., 1832, nor Roxb., 1835, nor Sieber, 1844, nor Sw., 1864, nor Vahl, 1921, nor Wall., 1851, nor Weigelt, 1851, nor Willd., 1800]. Avicennia tomentosa Schau. ex Moldenke, Prelim. Alph. List Invalid Names 6, in syn. 1940. Avicennia nitida var. trinitense Moldenke apud Stellfeld, Arquiv. Mus. Paran. 4: 246, sphalm. 1945. Avicennia schaueriana Leechm. & Stapf apud Pickel, Piso & Marcgrave Bot. Bras. 64. 1949. Avicennia schaueriana Stapf & Leechman apud Stearn, Kew Bull. 1958: 36. 1958.

Literature: Jacq., Select. Stirp. Amer. Hist. 177—178, pl. 112, fig. 1 & 2. 1763; Vell., Fl. Flum. 6: pl. 56. 1827; Brunner, Flora 23 (1): Beibl. 20—22. 1840; Miq. in Lehmann, Plant. Preiss. 1: 353. 1845; Schau. in A. DC., Prodr. 11: 699—700. 1847; Schau. in Mart., Fl. Bras. 9: 306. 1851; Griseb., Cat. Pl. Cub. 217. 1866; Schenck, Flora 72: 83—88. 1889; Jacks., Ind. Kew. 1: 254. 1893; Wettstein, Veg. Südbras. pl. 17 & 18. 1904; Urb. in Mart., Fl. Bras. 1 (1): 1. 1906; Warming & Vahl, Ecol. Pl., ed. Groom, 235—236. 1909; Löfgren & Everett, Sist. Analit. Pl. 162. 1910; Glaz., Bull. Soc. Bot. France 58 Mém. 3: 548. 1911; Luederwaldt, Revist. Mus. Paulista 11: 329. 1919; Luetzelburg, Estud. Bot. Nordeste 3: 224. 1923; Decker, Lebensbild. Fl. Bras. 159. 1932; Warming & Graebn., Lehrb. Oekol. Pflanzengeogr., ed. 4, 473. 1933; Houard, Zocéd. Pl. Amer. Sud 353—354. 1933; Moldenke, Phytologia 1: 96—97. 1934; F. C. Hoehne, Bot. & Agr. Bras. Sec. 16: 292, 293, 313, & 356. 1937; F. Silveira, Rodriguesia 3 (10): 145—146. 1937; Moldenke, Lilloa 4: 334 & 336. 1939; Moldenke, Geogr. Distrib. Avicenn. 10—12, 25, & 28. Sept. 20, 1939; Moldenke, Alph. List Common Names 7, 9, 13, 19—21, 28, & 33. August 31, 1939; F. C. Hoehne, Pl. & Subst. Tóx. 211. 1939; Moldenke, Prelim. Alph. List Invalid Names 5 & 6. 1940; Moldenke in Pulle, Fl. Surin. 4 (2): 323. 1940; Moldenke, Carnegie Inst. Wash. Publ. 522: 215. 1940; K. Krause in Engl., Bot. Jahrb. 71: Literaturber. 41. 1940; J. A. Clark, Card Ind. issue 166. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 29, 30, 36, 41, & 86. 1942; Moldenke, Alph. List Invalid Names 5. 1942; Moldenke in Lundell, Fl. Tex. 3 (1): 11. 1942; A. Schultz, Introd. Estud. Bot. Sist. 519 & 530. 1943; Mart., Arquiv. Mus. Paran. 3: 242. 1943; Moldenke, Phytologia 2: 93. 1944; V. J. Chappm., Journ. Linn. Soc. Lond. Bot. 52: 429. 1944; Roig, Pl. Med. Cuba 449—450. 1945; Stellfeld, Arquiv. Mus. Paran. 4: 237—248. 1945; Moldenke, Alph. List Cit. 1: 9, 29, 44, 61, 65, 68, 70, 71, 78, 89, 112, 115, 117, 120, 161, 165, 170—172, 211, 215, 222, 226, 227, 236, 237, 239, & 270. 1946; Terrac, Trav. Lab. Mat. Med. 33 (3): 101. 1947; E. J. Salisb., Ind. Kew. Suppl. 10: 26. 1947; Moldenke, Alph. List Cit. 2: 334, 365, 368, 369, 413, 425, 428, 429, 433, 435, 444—446, 448, 484, 485, 501, 502, 534, 552, 566, 576, 598, 601, & 621 (1948), 3: 669, 670, 675, 684, 708, 709, 711, 737, 745, 751, 756, 772, 814, 822, 824, 847, 852, 854, 856, 890, 891, 900, 920, 922, 950, & 969 (1949), and 4: 1007—1009, 1013—1015, 1017, 1021, 1043, 1066, 1072, 1081, 1086, 1094, 1106, & 1133. 1949; H. N. & A. L. Moldenke, Pl. Life 2: 81. 1948; Moldenke, Known Geogr. Distrib. Verbenac.,

[ed. 2], 54, 56, 57, 75, 100, & 174. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 3. 1949; Pickel, Piso & Marcgrave Bot. Bras. 64 & 89. 1949; Stellfeld, Lilloa 20: 213 & 214, pl. 2, fig. 4, & pl. 3, fig. 6. 1949; Moldenke, Phytologia 3: 286. 1950; Stellfeld, Trib. Farmac. 19 (10): 170. 1951; Roig, Dicc. Bot. 2: 987. 1953; Moldenke in Cheesman, Fl. Trin. & Tob. 2 (6): 418-420. 1955; Moldenke, Fam. 3 Avicenn. 2-4. 1955; Cuatrecasas, Bol. Soc. Bot. Mex. 23: 94. 1958; Stearn, Kew Bull. 1958: 36. 1958; Moldenke, Résumé 61, 63, 74, 87, 118, 235, 236, 418, & 440. 1959; Moldenke, Résumé Suppl. 1: 4 & 6 (1959) and 2: 5. 1960; Reitz, Selowia 11: 74 & 89. 1959.

Illustrations: Vell., Fl. Flum. 6: pl. 56 [as *A. nitida*]. 1827; Wettstein, Veg. Stüdbras. pl. 17 & 18 [as *A. tomentosa*]. 1904; Stellfeld, Lilloa 20: pl. 2, fig. 4, & pl. 3, fig. 6. 1949.

Shrub or tree, to 16 m. tall, with pneumatophores; trunk to 13 cm. in diameter; branchlets and twigs slender, mostly dark-brown or nigrescent, mostly subterete, usually glabrous and shiny; petioles rather slender, 2-20 mm. long, mealy or glabrous; leaf-blades firmly chartaceous or subcoriaceous, dark-green above and decidedly brunnescent or nigrescent in drying, dull, elliptic or elliptic-ovate to oblanceolate or obovate, 1.7-8.2 cm. long, 1.1-3.8 cm. wide, mostly obtuse or rounded at the apex, entire, usually cuneate at the base or rarely merely acute or broadly rounded, mostly glabrous and densely impressed-punctate above (rarely more or less densely pulverulent), varying from densely grayish-farinaceous to glabrous and impressed-punctate beneath; inflorescence axillary and terminal, spicate, rather loose; spikes 2.5-6.5 cm. long, 1-1.5 cm. wide during anthesis, the axillary ones usually confined to a single pair at the base of the terminal one and shorter than it; flowers opposite, sparse, only 1-5 pairs per spike, sessile, the pairs usually distant, the lowest pair frequently subtended by a pair of foliaceous stipitate bracts resembling miniature leaves; bractlets and prophylla ovate, sessile, obtuse or acute at the apex, densely appressed-pubescent; flowers fragrant; calyx about 2 mm. long, equalling the corolla-tube and ovary; corolla white, the lobes spreading, subquadrant-linear or sometimes slightly wider toward the apex, about 3 mm. long and 2 mm. wide, sericeous beneath, glabrous above, the 3 anterior ones very patent or reflexed and truncate at the apex, the posterior one shorter and broader, merely spreading, retuse at the apex; stamens inserted in the throat of the corolla, not projecting beyond the mouth of the corolla-tube; filaments short; stigma sessile or subsessile, exerted, very short; ovary conic, included, sericeous, completely hidden by the closely appressed calyx after the corolla has been shed; hypocotyl almost as long as the inner cotyledon, pubescent almost its entire length, mostly without visible side-rootlets in fruit; plumule not visible to the naked eye; fruit pale sap-green, very seldom with a purple tinge, flatter, more pointed, and considerably smoother than in *A. germinans*.

This much misunderstood species is found in swamps and mangrove formations, the mud of tidal estuaries and seashores, along

creeks of partially salt water, in the "manguesal fluvial", and on ground sometimes covered by high-tide, from sea-level to 2 meters altitude. It is described as a "locally frequent tree" in Trinidad by Cowan & Forster. Collectors have found it blooming from January to March and in September and October, and in fruit in March, May, July, and September. Its wood is said to make good lumber and fuel.

Vernacular names recorded for what is presumably this species are "caju", "cajú", "cereiba", "ciriba preta", "ciriuba", "fromarina", "javamataia", "magae siriba", "mangue", "mangue-amarelo", "mangue branco", "mangue-branco", "mangue bráfico", "mangue canoé", "mangue conoé", "mangue seriba", "mangue seriva", "mangue siriba", "mangue-siriuba", "páo de caranguejo", "saraiba", "sireiba", "sireíba", "siriba", "siriruba", "siriuba", "siriúba", "siriúva", "siriúwa", "siruva", "white mangrove", and "white-mangrove".

The binomial, Avicennia tomentosa, has been widely used and equally widely misapplied to various species of this genus. Various authors have used homonyms credited to previous authors, who, in their estimation, had misapplied the binomial. Thus, the A. tomentosa credited to Blume is actually A. alba Blume, that credited to Blanco is A. marina var. rumphiana (H. Hallier) Bakh., that credited to Linnaeus, to Vahl, and to Wallich is A. marina (Forsk.) Vierh., that credited to R. Brown and to Sieber [Old World] is A. marina var. resinifera (Forst.) Bakh., that credited to Roxburgh and to Willdenow is A. officinalis L., and that credited to Jack, to Jacquin, to Linnaeus & Jacquin, to G. F. W. Meyer, to Nuttall, to Nuttall & Brown, to Sieber [New World], to Swartz, and to Weigelt is A. germinans (L.) Stearn. The A. tomentosa var. acutifolia of Blanchet and vars. campechensis, cumanensis, and guayaquilensis of Humboldt, Bonpland, & Kunth are A. germinans, var. arabica of Walpers is A. marina, var. asiatica of Walpers is A. officinalis, var. australasica of Walpers is A. marina var. resinifera, and var. owarensis of Walpers is A. africana P. Beauv.

Schauer, in DeCandolle's "Prodromus" and in Martius' "Flora Brasiliensis", apparently misapplied the binomial, A. tomentosa, to the plant here being discussed, and in this he has been followed blindly by numerous later authors. In 1917, however, Allayne Leechman made careful observations on the mangroves near Georgetown, British Guiana, and sent a series of specimens to Kew. Otto Stapf studied this material and prepared a lengthy memorandum which he never published, but which Stearn has quoted in part in the Kew Bulletin for 1958. This memorandum is well worth publishing in its entirety here for the information of future workers on the genus:

"Avicennia. The two forms collected by Mr. Leechman are (a) A. nitida and (b) A. tomentosa, as understood in Flora Brasiliensis.

"(a) A. nitida. Jacquin's A. nitida from Martinique has leaves which in outline and size (see his fig. in Select. Stirp. Amer. Hist. tab. 112) are very like those of no. 8 of Mr. Leechman's set, but according to the description which is borne out by Jacquin's own specimen (in the British Museum collections) they are glabrous and shining on both sides and not whitish papillose-tomentose underneath. We have a similar form from 'Brazil' (Rio de Janeiro?) Sellow, and Pernambuco, Gardner 1101, and slightly less pronounced from Surinam (Hostmann, 457). In all these specimens there are younger leaves present which are whitish underneath with the tomentum characteristic of and usually persistent in this species. Gardner says that his specimens were taken from 'a very large tree'. It would be interesting to know whether this ultimately glabrescent form represents a definite race or an age state. To judge from the very ample material of A. nitida, American and African (A. africana = A. nitida), which I have seen, I am inclined to see in it a race, characterized by the ultimately complete glabrescence of the leaves (or at least the first leaves of a season's growth). I wonder whether Mr. Leechman has come across it and can throw any light on it. His observation that the varying leaf-forms of A. nitida are connected with ecological conditions is highly interesting and important. Several more forms could be added from our collections; but are they not also in part connected with age and racial differentiation? Until we know more about these matters, it will be sufficient to treat all these forms simply as A. nitida, qualifying the term if desirable, by the addition of 'foliis lanceolatis acutis' or 'f.....oblongis obtusis' etc. or their English equivalents.

"(b) A. tomentosa, Jacq. The application of this name by authors generally is highly conflicting and very unsatisfactory. This is mainly due to Jacquin's very meagre account of the species and his figure of a single leaf on tab. 112 of his Select. Stirp. Amer. Hist. His diagnosis (l.c. p. 177) runs 'foliis subtus tomentosus' to which he adds a number of synonyms and this description 'Arbor vigintipedalis vel altior, habitu prorsum praecedentis. Folia ovato-oblonga, obtusa, facie glabra et virentia, dorso vestita tomento denso tenuissimo ac incano, petiolis crassis'. Finally he states 'Habitat in plerisque Caribaeis & in Continentvicina'. The figure quoted represents a leaf which might be described as ovate-elliptic, very obtuse at the apex and slightly cordate at the base, 8 cm. by 4.5 cm., with a stout petiole, 5 mm. long. Now there is a leaf on a sheet of Jacquin's in the collection of the British Museum which answers this drawing exactly apart from the base which is broadly rounded, not cordate -- that is the basal curve of the leaf meets the petiole without forming a sinus at all. The resemblance is indeed so great that it may be assumed to be the very leaf from which the drawing was made. The texture, colour, and tomentum of the leaf is exactly that of the common form of A. nitida.

The same leaf-shape is represented in a specimen in the Kew Herbarium, collected by J. R. Johnston in the island of Sa. Margarita off the Coast of Cumana -- except that the leaves are somewhat smaller, the largest measuring 7 cm. by 4.5 cm. -- and also in the form described by Kunth (in Humb. & Bonpl. Nov. Gen. ii. 283) as A. tomentosa var. cumanensis from the coast of Cumana ('foliis oblongis aut elliptico-oblongis, utrinque rotundatis, brevissime petiolatis'). Thus there is sufficient evidence to show that Jacquin meant by his A. tomentosa a state of A. nitida with obtuse and rather broad, underneath whitish leaves and that he figured an extreme form corresponding to Kunth's var. cumanensis. This is confirmed by his quotations excepting the last 'Oepata, Rheed. Mal. 4. p. 95, t. 45' which belongs to A. officinalis L. (emend.), an exclusively Indo-Malayan species. Of his quotations those from Brown and Sloane can be connected with well preserved specimens which represent the common narrowly oblong-leaved A. nitida of Jamaica, whilst that from Loeffling points to a plant having 'folia.....lanceolata.....acuminata triuncialis...infra glauco-incana', evidently also one of the common forms of A. nitida. Comparing Jacquin's own specimens of A. nitida and A. tomentosa meagre as they are and representing such extreme forms one is not surprised that he saw in them distinct species. Whether he ever came across the 'A. tomentosa' of Schauer (Flora Brasiliensis) is more than doubtful. The smaller flowers with their inside glabrous corollas and short styles would have struck him as distinct from those of A. nitida which he figures correctly. This 'A. tomentosa Schauer, non Jacq. nec aliorum' has no name, and the only synonym which I find quoted for it, namely A. elliptica, Holm (erroneously attributed to Thunberg) from Brazil is in all probability A. nitida. It is described as having elliptic, acuminate leaves, a span long and almost an inch wide, such as occur frequently in Brazilian and Guiana specimens. It seems to me that Schauer having given first a correct description of this plant, A. Schaueriana would be a convenient and appropriate name for it."

Thus Mr. Leechman's Avicennia would be referable to A. nitida, Jacq. and A. Schaueriana, Stapf & Leechman, if Mr. Leechman will allow me to join his name to mine."

The notes by Mr. Leechman referred to by Stapf are in a letter from him dated February 24, 1917, from Queens College, Georgetown, British Guiana, which reads as follows:

"At only one spot in the strip of coast which I have had under observation for the last two years have I found anything which could be identified as A. tomentosa. In this cove two distinct varieties of Avicennia are certainly present, and the differences between them are most obvious when they are young. In addition to the broad leaves and sessile stigmas other points of difference from the typical A. nitida are:- a) stamens not projecting beyond mouth of corolla-tube, b) inflores-

cence less 'condensed', c) fruit pale sap-green, very seldom with a purple tinge, d) fruit flatter and more pointed than in A. nitida - also considerably smoother, e) corolla-lobes not reflexed.

"In A. nitida the fruit frequently turns almost plum-coloured where exposed to the sun, and the corolla-lobes are finally completely bent back till they touch the tube, when the blackened anthers and the projecting bi-lobed stigma become very conspicuous.

"Unfortunately Avicennia is a very variable plant. The condition in which it grows may change from fresh to highly saline, and the change affects the tree considerably. Sheets 14, 15, and 16 illustrate this, and I hesitate to express an opinion on the validity of the suggested species tomentosa in the light of my experience. I have not yet found a full-grown tree showing the tomentosa characters, and even seedlings which begin as typical tomentosa will change so materially as a result of a change in their environment (drying up of pool, invasion by sand, and what not) that they become 'doubtful'. In saplings up to 10-12 feet high, growing in uniform and favorable conditions ('sling mud' constantly wet) the tomentosa characters are often quite typical, and I am naturally keeping these plants under close observation."

Schauer's original description of "Avicennia tomentosa Jacq." in A.D.C., Prodr. 11: 699-700 (1847) is "foliis obovato-ellipticis, obtusissimis, in petiolum attenuatis, supra demum subnitidis, subtus candicantibus (aetate interdum glabrescentibus); spicis brevibus, basi plerumque interruptis; corollae lobis patentissimis, subquadrato-linearibus, truncatis, postico breviori retuso, omnibus subtus sericeis, supra glabris; germine incluso, conoideo, sericeo; stigmatibus subsessilibus."

In my discussion of the family in "The Flora of Trinidad and Tobago" (1955) I have keyed out the two east coast species as follows:

1. Corolla-lobes tomentose on both surfaces; leaf-blades usually sharply acute at the apex.....A. germinans.
- 1a. Corolla-lobes glabrous above; leaf-blades usually rounded at the apex.....A. schaueriana.

The editor as assigned to the former the common name of "Black mangrove" and to the latter the name of "White mangrove", which is apparently the usual application of these names in Trinidad and Tobago. In the United States, however, the name "White Mangrove" is usually applied to Laguncularia racemosa Gaertn. f., in the Terminaliaceae.

Stellfeld, on page 245 of his 1945 publication, cited above, has this to say about the key given above (given by me also in Lilloa 4: 334. 1939): "Esta maneira de diferenciar a espécie, deixou-nos durante algum tempo atrapalhados, desde que, mais adiante, descobrindo propriamente a planta, disse que 'as flores assemelham-se às da espécie precedente, contudo os lobos da corola são glabros interiormente', parecendo assim que a corola devia ser completamente lisa: interiormente e em cima,

ou seja a parte exterior, quando na realidade Moldenke queria se referir na posição da flor desabrochada, quando os lobos, respectivamente a parte interna dos lobos fica voltada para cima, mostrando-se desta maneira glabra, enquanto que a parte externa e agora inferior apresenta-se revestida de pêlos. Desde que empregou expressões diferentes na chave e na descrição, seria preferível anotar a presença de pêlos em ambas as faces dos lobos da corola (A. nitida) e apenas na face externa (A. Schaueriana)."

On the following page he makes these comments about the ranges of the two species and their common names in Brazil: "E quanto a distribuição geográfica, para a primeira espécie: desde a parte meridional dos Estados Unidos, através as Bermudas, as Bahamas e as Índias Ocidentais, ambas as costas do México e América Central, até as costas da Colômbia, Equador, Péru, Venezuela, as Guianas e o Brasil, e também as ilhas de Galapagos. E para a segunda: desde a Martinica e Granada até o Brasil meridional e Uruguai. Como se vê, embora bem definidas as espécies, no que diz respeito à distribuição pelo Brasil tudo muito vago, dando contudo a entender que a A. nitida é encontrada no Brasil (possivelmente não em toda a costa) e a A. Schaueriana até o Brasil meridional. E relativamente aos nomes vulgares novas controversias: black-mangrove a A. nitida e ciriba-preta a A. Schaueriana, que também tem o nome de mangue-branco, o que não é possível." on page 247 he says "Consideramos esta coleta a mais preciosa de todas e seguindo as descrições de Moldenke, então disponíveis, pudemos nos certificar que se tratava da Avicennia Schaueriana (Museu Paranaense, 1799), que se diferencia ainda da A. nitida pela inflorescência: espigas com 1--5 pares de flores para a primeira e 1--15 pares a segunda. Sentimos também o mesmo aroma de mel, tal como havia percebido Marcgrave, exalado pelas pequenas flores brancas e lembrando o da magnólia. Incontestavelmente duas são as causas principais do imperfeito conhecimento destas duas Avicencias em terras brasileiras: a dificuldade em ser atingido o seu habitat e a possibilidade ou não de ser encontrada florescida."

Stearn, in the publication cited above (1958), separates the two species as follows:

1. Leaves mostly acute at the apex; corolla-lobes tomentose on both surfaces; style elongated.....A. germinans.
- 1a. Leaves mostly rounded at the apex, sometimes acute; corolla-lobes glabrous inside, tomentose outside; style very short, the stigma hence almost sessile.....A. schaueriana.

He gives the "Restricted type-locality" as Brazil. The cotype collections, therefore, would be the Brazilian collections cited by Schauer in A. DC., Prodr. 11: 699--700 (1847). These are Blanchet 1427, Martius 108, Salzmann 430, Gaudichaud s.n., Pohl s.n., and Riedel s.n., from Rio de Janeiro and "Soteropolis".

I regret that I cannot agree with my friend Stearn in his "correction" of the specific epithet of this species to "schauerana". I have given my opinion several times elsewhere

[e.g., Fedde, *Repert. Spec. Nov.* 41: 142. 1936; Moldenke, *Résumé* 418. 1959] as to the undesirability of "correcting" the spelling of scientific names. In this case, Stapf's original proposal was "schaueriana". The original valid publication was also thus. Up to the time of Stearn's proposal the name had been spelled "schaueriana" 183 times in botanical publications (15 times in 1939, 3 times in 1940, 10 times in 1942, once in 1944, 6 times in 1945, 36 times in 1946, once in 1947, 34 times in 1948, 73 times in 1949, once in 1950, once in 1951, and twice in 1955). In addition, it has been spelled thus on 247 formal printed and type-written annotation labels placed on herbarium specimens and mounted illustrations in 40 different herbaria in Austria, Belgium, Brazil, Canada, Denmark, England, France, Germany, Netherlands, Scotland, Sweden, Switzerland, Trinidad, United States, and Uruguay. I see no valid reason for changing the spelling now.

The type of A. nitida var. trinitensis was collected by R. L. Brooks [*Herb. Trinidad Botanical Garden* 12656] in the Caroli swamp, Trinidad, on May 29, 1932, and is deposited in the Britton Herbarium at the New York Botanical Garden. Most of the Trinidad material of this species has entirely glabrous leaves, but *Herb. Trin. Bot. Gard.* 2402 and 8695 show the typical pubescence of A. germinans; all have a rounded leaf-apex.

It is worthy of note that while Schauer's description of "A. tomentosa Jacq." actually applies to A. schaueriana, some of the specimens which he cites (*viz.*, those from Mexico, Florida, the West Indies, Venezuela, and Ecuador) are A. germinans.

The Moll specimen cited below was probably collected by Von Rohr in either Martinique or Trinidad. West Indian specimens accredited to Moll in the Martius Herbarium were not collected by him since he severed connection with the expedition of which he was a part before it went to the West Indies. The collector's name "Salzmann" is misspelled "Saltzmann" in the Paris herbarium.

The label of Andersson 82 is inscribed "Monte Video. M. Anderson no. 82", but my good friend and colleague, Dr. Herter, told me shortly before his death that as far as he was aware Andersson never collected in Uruguay. Urban, however, in *Mart.*, *Fl. Bras.* 1 (1): 1 (1906) states that Andersson went from Rio de Janeiro to Montevideo and then on to Buenos Aires, the Straits of Magellan, the Galapagos Islands, Hawaii, Australia, and Cape of Good Hope. Therefore, I see no reason to doubt the accuracy of the label. The label on Glaziou 11323, on the other hand, is inscribed "Rio de Janeiro", but the material was actually collected at Itapemirim, near the sea, in Espirito Santo, according to Glaziou's own notes in *Bull. Soc. Bot. France* 58 *Mém.* 3: 548 (1911). It was misidentified by him, with a question, as A. africana P. Beauv. Several collections (*viz.*, *Broadway & Alexander s. n.*, *Herb. Trin. Bot. Gard.* 5405, *Gooding* 553) have been misidentified as Laguncularia racemosa in herbaria. Mostly, however, the species has been confused with and misidentified as A. nitida.

It has been recorded [as A. tomentosa Jacq.] by Luetzelburg, in the reference cited above, from Areia Branca in Rio Grande do Norte and from Cajú and Ila Grande in Rio de Janeiro. Chapman, in the reference also cited above, says "A. tomentosa Jacq., which is distinguished from A. nitida by broader leaves and sessile stigmas, is said to grow in a few Caribbean islands, and though recorded from Jamaica it was not seen in the vicinity of Kingston."

Houard reports that this plant is often infested by the insect, Erineum croceum Fée, in Guiana, and by an undetermined species of eriophide in Brazil and by an undetermined species of cecidomide, also in Brazil, all causing galls. The lichen, Polyblastia sp., has been found on its stems.

In all, 233 herbarium specimens, including some of the original cotypes and types of all the names involved, and 14 mounted photographs and illustrations have been examined.

Citations: WINDWARD ISLANDS: Barbados: E. G. B. Gooding 553 (Em). Grenada: W. E. Broadway s.n. [Woburn, St. George's swamp, March 17, 1905; Hort. Thenensis 14508] (Br, E--photo, N, N--photo, Z--photo). Martinique: Plée s.n. (B). TRINIDAD: N. L. Britton 2595 [Herb. Trin. Bot. Gard. 9516] (R), 2595 [Herb. Trin. Bot. Gard. 10461] (N, R); W. E. Broadway 5817 (Ca--384277, Ca--415983, E--926140, F--699857, I); Broadway & Alexander s.n. [Herb. Trin. Bot. Gard. 5221] (B, R); R. L. Brooks s.n. [Herb. Trin. Bot. Gard. 12656] (N, R); Cowan & Forster 1252 (Z); W. G. Freeman s.n. [Herb. Trin. Bot. Gard. 7988] (R); Herb. Trin. Bot. Gard. 2402 (R), 5405 (B); R. C. Marshall s.n. [Herb. Trin. Bot. Gard. 12651] (N, R); R. O. Williams s.n. [Herb. Trin. Bot. Gard. 8695] (R). PATOS: Britton, Hazen, & Mendelson 541 (N, W--1047019). WEST INDIES: Island undesignated: Moll s.n. [Herb. Martius; Ind. occid.] (Br, N--photo, S--photo, Z--photo). BRITISH GUIANA: Leechman s.n. [near Georgetown, 1917] (N, N, Ut--70549a). BRAZIL: Bahia: Blanchet 1427 (Cb--cotype), 1477 (P); Herb. Reichenbach f. s.n. (V); Luetzelburg 401 (Mu, Mu, N--photo, V, V, Z--photo), s.n. [VIII, 1912] (Mu, N--photo, Z--photo); Martius 2148 (Mu--1083), s.n. [in maritimis prov. Bahiensis, 1819] (Mu--1690), s.n. [Soteropolis & Ilheos] (Mu--1082); Salzmann s.n. [1831] (Cb, Ed), s.n. (K, K, P). Ceará: Dias da Rocha 108 (N, Sp--7933); Drouet 2548 (E--1110545, F--857467, F--949348, N, S). Espirito Santo: Glaziou 11317 (B, Br, Cb, Cp, K, N, P, P, S). Federal District: A. Lutz 817 [Herb. Lutz 817] (Ja); Moldenke & Moldenke 19606 (F, Mg, Mr, N, No, Ot, S, Sm, Ss). Florianopolis Island: Rambo 50320 (Im, N, S). Maranhão: Fróes 1812 (B, Bm, Cb, Cb, E--1042134, F--707083, I, K, Mí, N, P, S, Ut, W--1660151). Paraíba: Luetzelburg 12521 (Mu). Paraná: Dusén 212 (S), 11418 (B, Cb, W--1481835), 11418a (S), s.n. [Herb. Rio de Jan. 5004] (N); Hatschbach 1920 (N); Stellfeld 799 [Herb. Mus. Paran. 1799] (N). Pernambuco: Ridley, Lea, & Ramage s.n. [Aug. 4, 1887] (Em); Sobrinho 251 (It, N, Ug). Rio de Janeiro:

Andersson s.n. [1857] (S); Banks & Solander s.n. [1768] (Bm);
Collector undesignated 6 (C), s.n. [1835] (P), s.n. [Sebastianopolis] (C); Commerson 231 (P); Dusén 202 (S, W--1055656); Forsell 202 (S); G. Gardner 98 (Bm, Cb, K, S); Gaudichaud 264 (P), 464 (B, Br, Cb, Dc, N), s.n. [Rio Janeiro] (B--cotype, V--cotype); Ginzberger & Zerry s.n. [Manguinho] (V); Glaziou 1362 (Br, Br, Br, Br, Cp, Cp, F--667195, It, K, N, P), 11323, in part (B); Hemmen-dorff 442 (S); Herb. Rio de Jan. 31572 (N), 31775 (N), 32261 (Ja); F. C. Hoehne s.n. (N, Sp--24908); Kaempfe 363 (B); Luetzelburg 16058 (Mu), 16059 (Mu), 16077 (V), s.n. [XII.1910] (Mu, N--photo, Z--photo); Luschnath s.n. [Herb. Martius 108] (Br--cotype, Dc--cotype, K--cotype, M--cotype, Mu--1081--cotype, P--cotype, V--cotype); Martius s.n. [prope Rio de Jan.] (Mu--1084); Miers s.n. (Bm); Patschke 188 (B); Pohl 6141 (F--874771); Pohl & Schott 6141 (V); Regnell s.n. [1835] (Cb); A. Richard 2143 (S); Riedel & Luschnath 1007 (N); Saint-Hilaire A'267 (K, P, P, P, P, P); Schenck 2074 (B), 3830 (B, N); Sellow 304 (N), 304b (B); Ule s.n. [Herb. Rio de Jan. 32260] (Ja); United States Expl. Exped. [Wilkes] s.n. (T, W--59278, W--59279); Vauthier s.n. [1836] (P); Warming s.n. (Cp). Rio Grande do Norte: Ginzberger & Zerry s.n. [Natal] (V). Santa Catarina: Reitz 5525 (N); Reitz & Klein 683 [Herb. Barb. Rodr. 6961] (N, S, W--2123175), 1183 (S, W--2142517), 1414 (W--2142574); Schenck 1225 (B, B); Tweedie s.n. (K); Ule 3884 (B). Santa Catarina Island: Reitz 5088 [Herb. Barb. Rodr. 6323] (N, N). São Paulo: Gaudichaud 275 (P); F. C. Hoehne s.n. (It, K, N, N, Sp--30854, Sp--30854); Ilien s.n. [Santos, 12/1914] (Us); Jönsson s.n. [Santos, XII.1914] (Lu, Lu); Löfgren s.n. [Herb. Geogr. & Geol. 3062] (N, Sp--15596); Mosén 3450 (S, S, S); F. Noack 18 (N); Pickel 3210 (It, N, Sf); Saint-Hilaire C².7665 [1665] (N, P); Usteri s.n. (N, Sp--15598). State undetermined: Burchell 1105-105 (K); Caminhao s.n. (V); Collector undesignated s.n. (V, V, V); Glocker s.n. (Bm, S); Riedel & Sellow s.n. (S); Sellow s.n. [Brasilia] (B, Bm, Bm, N, P, P, Vt); Vidal s.n. [Herb. Rio de Jan. 31546] (N). URUGUAY: Andersson 82 (Cb). MOUNT-ED ILLUSTRATIONS: Vell., Fl. Flum. 6: pl. 56. 1827 (Cb, S).

AVICENNIA TONDUZZII Moldenke, Phytologia 1: 273--274. 1938.

Synonymy: Avicennia tonduzzi Cuatrecasas, Bol. Soc. Bot. Mex. 23: 94. 1958.

Literature: Moldenke, Phytologia 1: 273--274. 1938; Standl., Field Mus. Publ. Bot. 18: 998--999. 1938; Moldenke, Geogr. Distrib. Avicenn. 17. 1939; Moldenke, Alph. List Common Names 23. 1939; J. A. Clark, Card. Ind. issue 160. 1939; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 22, 23, & 86. 1942; Moldenke, Phytologia 2: 93. 1944; Moldenke, Alph. List Cit. 1: 58 & 301. 1946; E. J. Salisb., Ind. Kew. Suppl. 10: 26. 1947; Moldenke, Alph. List Cit. 2: 340, 341, 346, 389, 416, 436, & 437 (1948), 3:

817, 818, & 978 (1949), and 4: 999, 1000, 1025, 1026, 1059, & 1243. 1949; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 39, 41, & 174. 1949; Cuatrecasas, *Bol. Soc. Bot. Mex.* 23: 94. 1958; Moldenke, *Résumé* 46, 49, 65, & 440. 1959; Moldenke, *Résumé Suppl.* 1: 15. 1959.

Tree, to 11.5 m. tall; branchlets and twigs slender, obtusely tetragonal or subterete, jointed, the youngest parts densely matted-tomentellous with flavidous puberulence, the older parts less densely puberulent with gray or cinereous-sordid or, at least, not so pronouncedly flavidous, hairs, or even glabrate, the youngest parts wrinkled in drying, the nodes swollen and annulate; principal internodes 0.7--4.5 cm. long; leaf-scars very conspicuous; leaves decussate-opposite, numerous; petioles slender or stoutish, 0.8--2 cm. long, densely appressed-puberulent or matted-tomentellous with very minute hairs like the twigs, not noticeably ampliate at the base, mostly wrinkled in drying or wrinkled-striate; leaf-blades coriaceous, bright-green and somewhat shiny above, gray beneath, oblong or elongate-oblong to elliptic, 7.3--17 cm. long, 1.6--4.8 cm. wide, obtuse or blunt to subacute at the apex, entire, acute or subacuminate to acuminate or long-attenuate at the base and prolonged into the petiole, densely and very minutely pulverulent and impressed-punctate above, becoming glabrescent in age, uniformly very densely matted-tomentellous beneath with closely appressed, minute, cinereous or sordid to flavidous hairs like the twigs; midrib slender, flat and deeply canaliculate above from the base to about $\frac{2}{3}$ the length, then rounded-prominent to the apex, rounded-prominent beneath; secondaries very slender and numerous, 15 or more per side, not much different from the larger veins which almost parallel them, plainly anastomosing at the very margins on both surfaces in an almost straight line, prominent on both surfaces; vein and veinlet reticulation sparse, the larger portions prominent on both surfaces; inflorescence axillary and terminal, cymose, paniculate, 3--6 cm. long and wide, usually regularly several-branched from the very base, the branches many-flowered, the axillary ones crowded in the uppermost axils, 2--3 cm. long and 1--2 cm. wide, the terminal ones 3--5 cm. long and 3.5--4 cm. wide; peduncles, rachis, and branches of the inflorescence densely matted-tomentellous and wrinkled-striate like the petioles; bractlets ovate, a pair subtending each pair of inflorescence-branches; flowers sessile; prophylla 3, ovate, about 2 mm. long and 1.5 mm. wide, strigose at the center on the back, villous-tomentose toward the margins, rounded or obtuse at the apex, simulating sepals and closely appressed to them, imbricate; sepals 5, separate, imbricate, broadly elliptic or subrotund, about 2.5 mm. long and wide, rounded at the apex and base, densely villous-tomentose on the back; corolla hypocrateriform, its tube broadly cylindric, short, straight, about 1 mm. long, glabrous on both surfaces, its limb 4-parted, the lobes equal, wide-spreading during anthesis, narrowly elliptic-lingulate, about 3 mm. long and 1.5 mm. wide, rounded at the apex, densely tomentose on both surfaces; stamens 4, inserted about 0.5 mm. above the base of the corolla-

tube, equal, exerted; filaments slender, about 1.5 mm. long, glabrous; anthers oblong, about 0.75 mm. long and 0.375 mm. wide, 2-celled, not appendaged, opening by longitudinal slits; pistil 1, compound, 2-carpellary; ovary ovate-subglobose, about 1.25 mm. long and wide, densely appressed-villous with antrorse hairs, not lobed, incompletely 4-celled; style terminal, comparatively stout, about 0.75 mm. long, densely appressed-villous; stigma bifid, its branches about 0.25 mm. long, unequal; ovules borne on a basal 4-winged placenta, pendent.

The type of this species was collected by Adolfe Tonduz (no. 6776) — in whose honor it is named — in the littoral zone bordering the Pacific Ocean at Punta Mala, Puntarenas, Costa Rica, in March, 1892, and is deposited in the herbarium of the Jardin Botanique de l'Etat at Brussels. Material of what appears to be the type collection is often found in herbaria with labels reading "Pittier 6776". Tonduz 6775 [Pittier 6775] is certainly topotype material and may possibly also be part of the original type collection. Tonduz 6775 in the British Museum herbarium was annotated "Avicennia sp. n. O. S[ta]pf" by Stapf when he was revising the American members of the group. The Brussels sheet of Herb. Inst. Physico-geogr. Nat. Costaric. 10060 has a large gall on one branchlet. A common name is "palo de sal". Stork says the plant is "common in mud flats, forms evergreen mat". Core describes it as a tree 35 feet tall, "associated with mangrove (feliz) along coasts of Pacific Ocean at mouth of Buenaventura". It has been collected in anthesis in March, April, and November, and has been widely misidentified as A. nitida Jacq. Standley says "similar to A. nitida, of which it may be only a form or variety, but differing in its somewhat smaller flowers." In all, 38 herbarium specimens, including the type, and 4 mounted photographs have been examined.

Citations: COSTA RICA: Puntarenas: Brenes 12222 [101; 701] (F--855888); H. Pittier 6775 (Br), 6776 (Br--type, N--photo of type, Z--photo of type), 7109 [Herb. Inst. Physico-geogr. Nat. Costaric. 10060] (Bm, K, Mu--3828, W--355403, W--1323378), 7110 [Herb. Inst. Physico-geogr. Nat. Costaric. 10066] (Bm, E--118578, F--76860, K, Mu--3835, N, N--photo, W--355404, W--1323377, Z--photo); Stork 4036 (Du--252414); Tonduz 6775 (Bm, N), 6776 (Mu--4053--isotype, P--isotype, W--1323382--isotype), 10060 (Bm, P, P), 10066 (Bm, P), s.n. [Herb. Inst. Physico-geogr. Nat. Costaric. 10060] (Br, Mu--3787, W--391998, W--1323381), s.n. [Herb. Inst. Physico-geogr. Nat. Costaric. 10066] (Br, Br, W--1323380). TABOGA ISLAND: H. Pittier 3614 (N). COLOMBIA: Valle del Cauca: E. L. Core 1569 (Le, N, N).

AVICENNIA AFRICANA P. Beauv.

Additional literature: Moloney, Sketch Forest. W. Afr. 524. 1887.

AVICENNIA ALBA Blume

Sørensen, Larsen, & Hansen describe the cortex as black.

Additional citations: KOH CHANG ISLAND: Sørensen, Larsen, & Hansen 7099 (Cp). THAILAND: Floto 7832 (Z); Sørensen, Larsen, & Hansen 537 (Cp), 2016 (Z).

AVICENNIA MARINA (Forsk.) Vierh.

The Sørensen, Larsen, & Hansen 120 specimen cited below has a broad leaf-miner tunnel in one of its leaves.

Additional citations: KOH CHANG ISLAND: Sørensen, Larsen, & Hansen 120 (Cp), 7098 (Cp). THAILAND: Floto 7820 (Z).

AVICENNIA OFFICINALIS L.

Additional literature: Sim, For. Fl. Cape Col. 287, pl. 120, fig. 3. 1907.

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MATERIALS TOWARD A MONOGRAPH OF THE GENUS STYLODON

Harold N. Moldenke

This is the twenty-third in my series of works of monographic nature on the genera of Verbenaceae, Avicenniaceae, Stilbaceae, and Symphoremaceae. Previous genera so treated were Aegiphila Jacq., Amasonia L. f., Avicennia L., Baillonia Bocq., Bouchea Cham., Casselia Nees & Mart., Castelia Cav., Chascanum E. Mey., Citharexylum B. Juss., Cornutia Plum., Parodianthus Troncoso, Petitia Jacq., Petrea Houst., Priva Adans., Pseudocarpidium Millsp., Recordia Moldenke, Rehdera Moldenke, Rhaphithammus Miers, Svensonia Moldenke, Tectona L. f., Vitex Tourn., and the New World and cultivated members of Callicarpa L.

Full explanation of the abbreviations employed for the names of the 255 herbaria whose material was examined in the preparation of these works and of the present paper will be found in Phytologia 5: 154-159 (1955), 6: 242 (1958), and 7: 91-92 & 123-124 (1960), with the following addition:

Gp = Ontario Agricultural College, Guelph, Ontario, Canada

STYLODON Raf., Neogenyt. 2. 1825.

Synonymy: Styleurodon Raf., Fl. Tellur. 2: 104. 1836.

Literature: Medic., Bot. Beobacht. 1783: 131. 1784; Walt., Fl. Carol. 166. 1788; Michx., Fl. Bor.-Am. 2: 14. 1803; Steud., Nom. Bot., ed. 1, 1: 873. 1821; Raf., Neogenyt. 2. 1825; Raf., Fl. Tellur. 104. 1836; Steud., Nom. Bot., ed. 2, 750. 1840; Schau. in A. DC., Prodr. 11: 545. 1847; A. W. Chapm., Fl. South. U. S., ed. 1, pr. 1, 307. 1860; A. Wood, Class-book, pr. 1, 537 (1861) and pr. 2, 537. 1863; A. W. Chapm., Fl. South. U. S., ed.